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COOPERATIVE

PLANT PEST CONTROL

PROGRAMS

FISCAL YEAR 1964

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PROCUREMENT SECTION
Alphabetical Serial File

Plant Pest Control Division
Agricultural Research Service
United States Department of Agriculture

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INTRODUCTION

Public concern over the impact of pest control programs to the environment, public health, wildlife, and other values continued throughout the year. There have been several developments in which the Plant Pest Control Division has taken the lead. These are positive steps in the restoration of public confidence in pest control and the recognition that food, feed, and fiber resources of the Nation must be protected against insects, plant diseases, nematodes, and weeds if current levels of production are to be maintained. This is also the year that positive action, supported by appropriated funds, has been taken to implement the recommendations of the President's Science Advisory Committee in its report released on May 14, 1963. Programs were developed to monitor cooperative Federal-State pest control efforts in Florida, Illinois, Michigan, New Jersey, North Carolina, Pennsylvania, and Wyoming. Contracts were let to conservation agencies, universities, and other organizations with the competency to conduct studies that would measure the immediate impact of control programs within areas being treated. These monitoring efforts involved studies on burrowing nematode, cereal leaf beetle, grasshopper control, gypsy moth, Japanese beetle, and witchweed.

A more detailed study began in the Lower Mississippi River drainage area during the year. Ten 1-square mile areas involving cotton, rice, and soybean production were selected for the study. These areas are typical of the farming practices and pest control by growers in the Mississippi Delta. The overall objective is to obtain information on existing levels of pesticide residues in the soil, water, and forage resulting from the use of pesticides in the past, and from the current year's pest control activities. In addition to this phase of the study, a program was initiated to determine the impact of standard control programs on non-target organisms, including insects.

The Division established a nationwide network to investigate agricultural pesticide accidents to obtain factual information which may be used in developing recommendations for the safe use of pesticides, as well as in other pest control considerations. Accidents reported from any source are cleared through the Division Director's Office where it is determined whether or not a full investigation is warranted. Once this determination has been made, field personnel of the Plant Pest Control Division make a full investigation to determine the cause of the incident. These reports are summarized and given wide circulation to cooperating State and Federal agencies.

The Division has taken an active part, and in some instances the lead, in the conduct of investigations to determine causes of contamination of the environment, especially in relation to reported fish kills. Many cases were investigated and documented during the past year. Wherever there was cause to believe that pesticides may have been implicated, samples of water, silt, and fish were collected for chemical analysis to determine authentically the role of pesticides in the particular case. Major pollution incidents investigated included those in the Missouri and Mississippi Rivers.

Information developed from these studies indicated that sources other than normal use of agricultural pesticides may be important factors in the contamination of the environment. This led to a comprehensive study on disposal of pesticides waste by formulators and others, and used pesticide containers. Findings from the study were evaluated in a special publication which has been widely circulated to promote corrective action in this important area of pesticide safety.

The use of aircraft to apply pesticides has been challenged in relation to safety and contamination. The problem of drift has been a major source of concern. The Plant Pest Control Division has taken the lead and developed a publication which the aircraft industry and its operators may use as a guide for safer application of pesticides and the minimization of drift.

Other recommendations of the President's Science Advisory Committee were that Federal agencies and the public should be encouraged to use the less persistent chemicals in minimum amounts. The Division's Methods Improvement Operations, through extensive field trials, has led the way in the development of techniques which will permit the use of low volumes of pesticides. The outstanding accomplishment has been the reduction in the amount of technical malathion required to control cereal leaf beetle, and grasshoppers. Modifications of equipment and application techniques have reduced the dosage required to less than 6 ounces of technical malathion for the cereal leaf beetle and 8 ounces for grasshopper control.

New advances and application techniques have permitted most cooperative Federal-State control and eradication programs to continue on schedule or have permitted substantial gains in yearly accomplishments. Other programs have been adjusted because of restrictions placed on the use of certain of the persistent pesticides. Accomplishments during 1964 are summarized on the following pages. More detailed information on the Plant Pest Control Division and the cooperative programs is available in a publication entitled "Activities of the Plant Pest Control Division," ARS 81-10, April 1963.

COOPERATIVE FEDERAL AND STATE PROGRAMS

BARBERRY ERADICATION

Stem rust is known as the most destructive disease of the cereal crops. In this country control is attained by the eradication of stem rust susceptible barberry bushes, and the growing of stem rust resistant varieties of small grains. With the development of new races of the rust organisms on the barberry, the eradication program is basic to the total control effort.

The wheat stem rust race complex has remained stable for the past several years with races 15B and 56 predominating. The spring wheat variety, Selkirk, which has resistance to these races, is grown on much of the acreage and this variety has come through without loss. With most of the acreage planted to Selkirk the spring wheat crop is highly vulnerable should a new race or biotype become established which would infect this variety. The winter wheats are susceptible to the currently dominant races and periodically this crop is damaged.

The oat stem rust problem has become increasingly complex. New races are increasing to which many of the common oat varieties are susceptible. All commercial varieties are susceptible to race 6AF which constituted 11% of the isolates in 1963. The role of the barberry in development of new races and the spread of oat stem rust were demonstrated in a study in Bradford County, Pennsylvania, in 1963. From 22 rusted oat collections made adjacent to and at radiating distances from infested barberry, seven races and subraces of oat stem rust were identified. In these direct spreads, race 4A was identified 14 times; 13A, 5 times; 6A, 4 times; 6F, 4 times; 6AF, 3 times; 4, twice; and 8A, once.

Good progress continues on the cooperative program to remove susceptible barberry plants throughout the 19 Northern States. There are now approximately 35,023 square miles remaining in the States which will need one or more inspections to assure eradication. The most active programs are in Illinois, Iowa, Kansas, Michigan, Missouri, Ohio, Pennsylvania, Virginia, and Washington. During fiscal year 1964, 7,066,468 rust-susceptible barberry bushes were destroyed on 2,432 properties in 16 States.

A brush killer consisting of 1 1/3 pounds of 2,4-D and 2/3 pound of 2,4,5-T per gallon has been used for many years as the approved eradication procedure on the native barberry. In recent years a number of new herbicidal materials have become available which could possibly provide as good or better results with a reduction in chemical and labor costs and provide greater ease in application. Some that have shown promise in the past on small plots as well as some of the newer ones were tested under controlled conditions during the spring and early summer of 1964. This was done under the direction of Methods Improvement personnel in an effort to improve eradication procedures against the native barberry as well as the introduced species. These tests will be continued during the fall and winter months.

The barberry eradication program includes the enforcement of Federal Quarantine No. 38. This requires the annual inspection of nurseries and dealer establishments to make sure that rust-susceptible barberries are not sold within or shipped into the eradication States. During the year 675 nurseries and dealer establishments were inspected and qualified for certificates which permit the growing and sale of nonsusceptible barberry stock.

The appearance of new races of the oat stem rust in Canada the past several years stimulated new interest in a barberry eradication program in Ontario Province. Canadian officials requested the assistance of Division personnel early in 1964 to aid in implementing a large-scale eradication program.



Nursery inspection for compliance with Quarantine No. 38

BOLL WEEVIL

A strain of the boll weevil which appears to be adapted to the hot, arid climate in the irrigated regions of the West has been a serious limiting factor in cotton production in the Presidio Valley of Texas since 1953. Surveys conducted along the Rio Grande indicated that this weevil was migrating up the river from Presidio and northward from infested areas in Mexico toward New Mexico and Arizona.

In 1961, the Plant Pest Control Division cooperated with the Entomology Research Division, the National Cotton Council, the State of Texas, and the Republic of Mexico in spraying cotton along a 125-mile strip bordering the Rio Grande River in Mexico and Texas between Ruidosa and Fort Quitman to halt the continued migration of the boll weevil up the river toward New Mexico. In 1962-63, this same area was treated. The program was expanded to include a small area in the El Paso Valley where a small infestation was discovered and to an area in northern Sonora, Mexico, where a boll weevil infestation threatens to spread into Arizona.

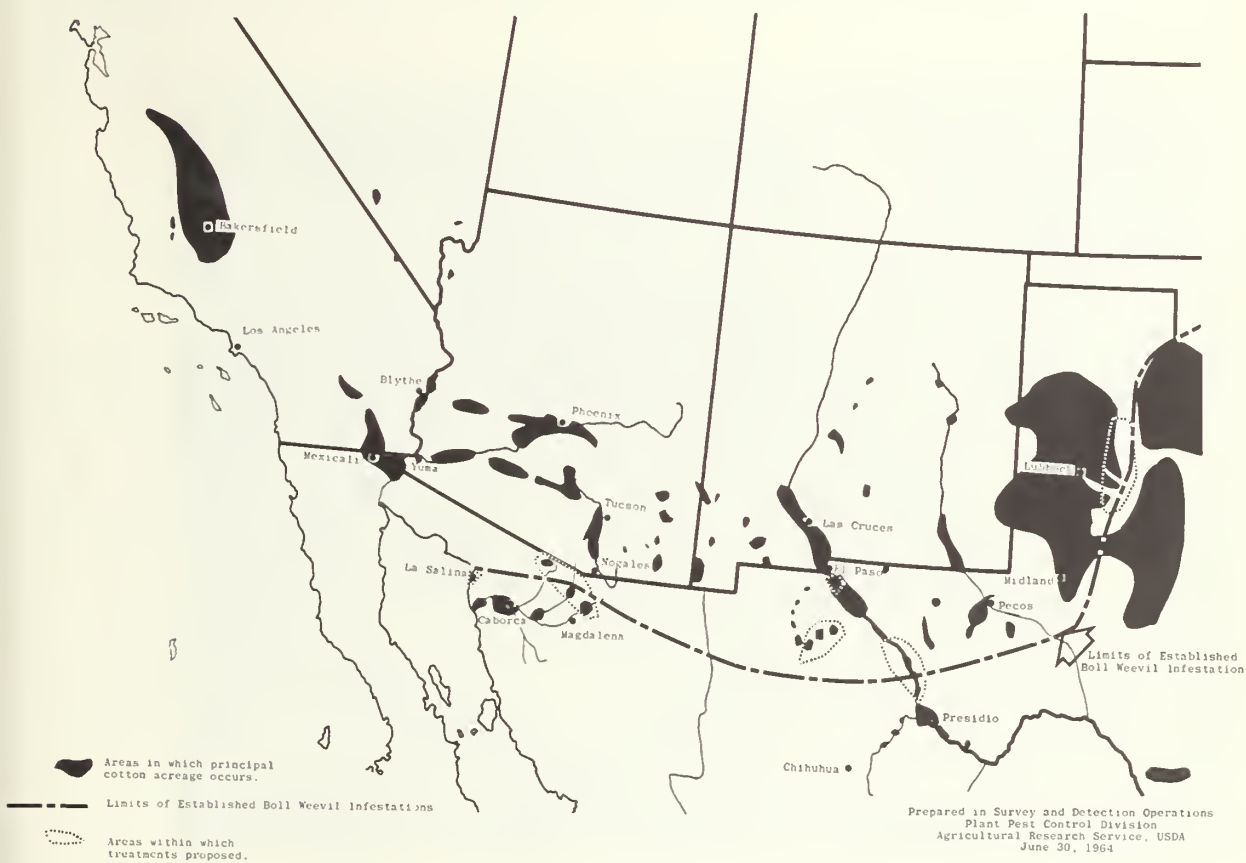
The results of this program have shown substantial reductions in the number of boll weevils in the areas treated. Surveys conducted in the fall of 1963 showed that the migrations were halted about half way up the river in the eradication area toward El Paso. The program has demonstrated that fall migration can be stopped.

In fiscal year 1964, the following aggregate acreages were treated: Sonora, Mexico, 12,769; along the Rio Grande River in Texas including the El Paso Valley, 8,885; and in Chihuahua, Mexico including the Juarez Valley, 11,075 acres.

In recent years increasing numbers of the boll weevil have been found during the growing season above the Cap Rock in the High Plains area of Texas. Prior to 1964, it was not believed that weevils would overwinter in this area. Tests were conducted during the winter of 1963-64 and weevils were found to pass the winter in hibernation cages. This is of great concern to the cotton interests of the immediate area as well as to those in New Mexico and other western cotton growing States where the weevil does not occur.

Interest was shown on the part of the cotton growers in the High Plains area of Texas early in 1964 in initiating a program which would prevent weevils from becoming established above the Cap Rock. This would reduce the population pressure below that area, and the possibility of further western spread. Should boll weevils become firmly established in the Texas High Plains, cotton areas in New Mexico, Arizona, and California would be in jeopardy.

Western Boll Weevil Problem

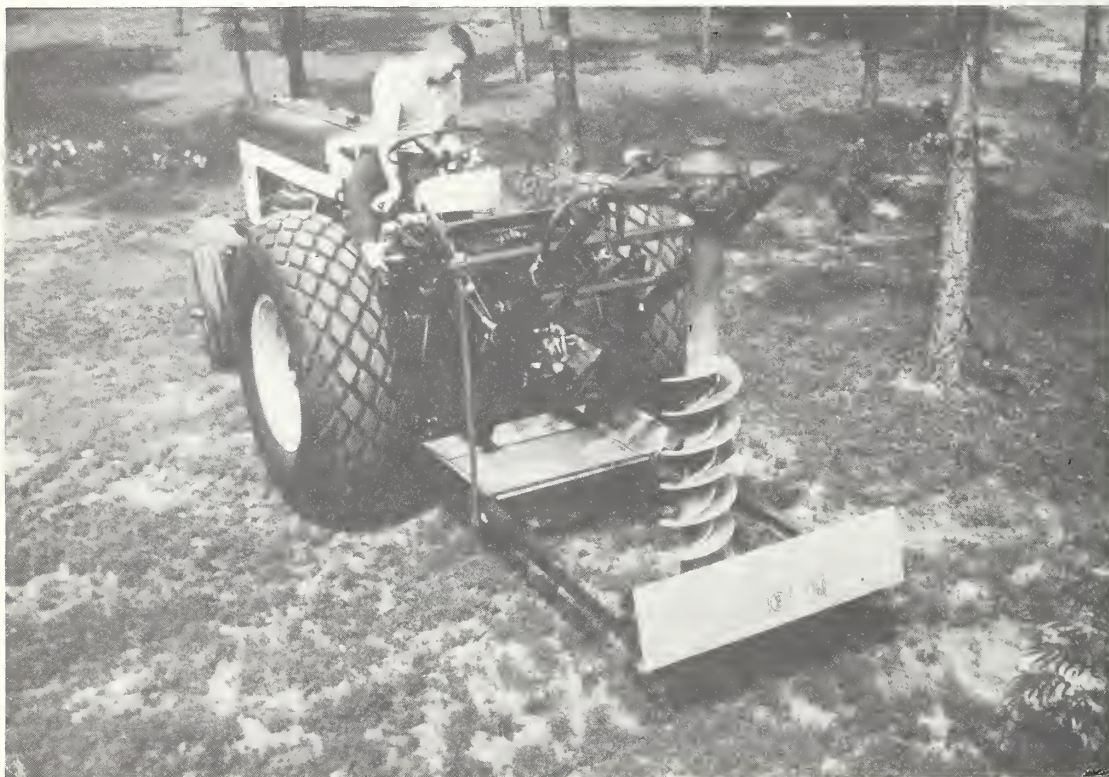


BURROWING NEMATODE

The principal activities on the burrowing nematode program are centered in the State of Florida. The objective is to prevent further spread of the pest to uninfested areas of the State and to eradicate existing infestations so that the land may be returned to profitable citrus production. The State Division of Plant Industry has responsibility for the regulatory and control phases of the program; the Plant Pest Control Division has general responsibility for surveys and laboratory examination of root samples.

Burrowing nematode control operations were begun in 1955. Control work was accomplished by (a) removal of all trees from an infested grove, (b) treat the land with a nematocide, and (c) replanting with clean nursery stock at the end of two years. This program was commonly referred to as the "push and treat." This work continued until 1961 when most groves seriously affected by spreading decline had been pushed and treated. The program was modified to provide for a chemical barrier or buffer zone to be established around an infestation to prevent spread. Under this method the grove owners continue to harvest citrus from declining trees until they deteriorate to a point where production is no longer profitable. When this point is reached the trees are removed and the land fumigated.

Altogether, 1,841 groves with 16,000 acres are considered infested. Infested citrus trees have been removed and the ground treated on 6,602 acres. More than 180 miles of barrier or buffer zone have been placed around 581 groves with 6,715 acres.



Improved soil auger used to recover citrus root samples from various depths on burrowing nematode surveys. The roots are examined in the laboratory for presence of R. similis.

CEREAL LEAF BEETLE

The cereal leaf beetle, Oulema melanopa, was first found in the United States in southwestern Michigan in July 1962 and shortly thereafter in adjacent areas of Indiana. Realizing the potential destructiveness of this beetle to cereal crops, both States placed infested areas under quarantine to minimize spread to other grain-producing areas. Additional infested counties in both Indiana and Michigan were found in 1963, and in May of that year the beetle was found for the first time in Ohio resulting in the prompt promulgation of a quarantine by that State. As of June 30, 1964, the three infested States had all or parts of 84 counties where the beetle had been found under uniform State regulations: 33 in Indiana, 32 in Michigan, and 19 in Ohio.

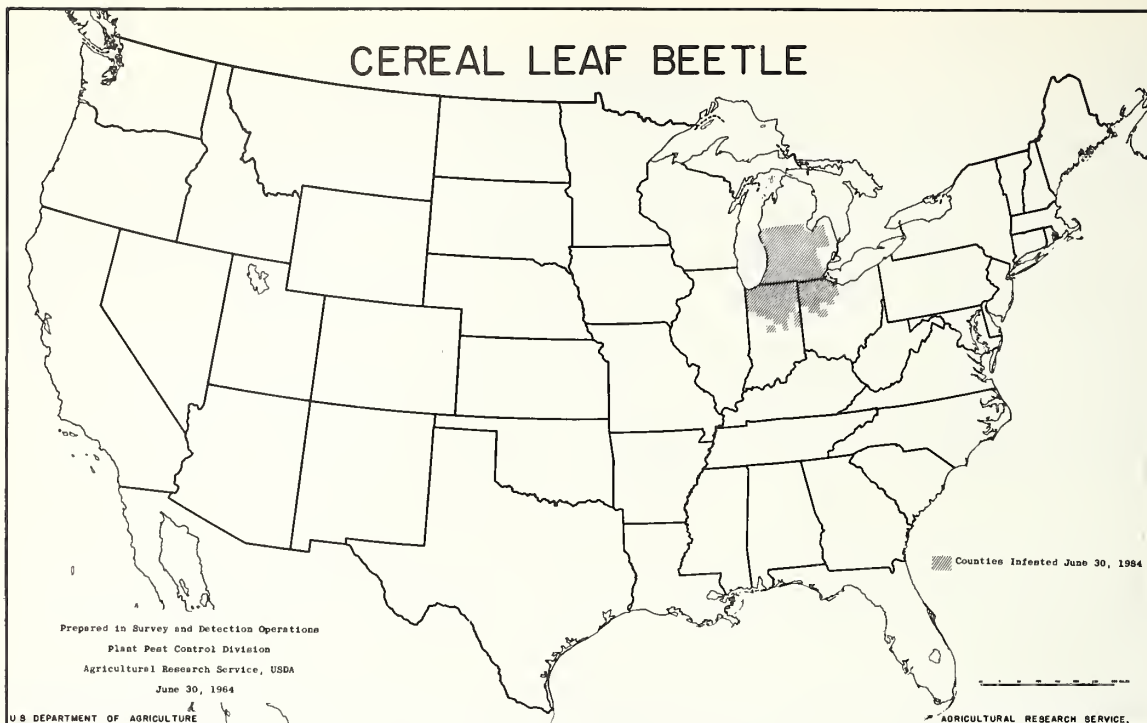
Quarantine regulations require that designated articles and commodities considered hazardous from the standpoint of spread are adequately treated, handled or processed to eliminate infestation prior to movement from the regulated areas. Some of the more commonly used certification procedures involve the treatment of small grains with malathion and the fumigation of hay and straw with methyl bromide. Other commodities are certified after careful negative inspection.

To suppress populations and minimize spread, the joint Federal-State control program initiated in the spring of 1963 was continued. The acreage with hazardous populations in 1964 was considerably greater than in 1963; 115,380 acres in the tri-state area of Michigan, Indiana, and Ohio were treated--some of which required two applications. Except for about 6,000 acres in Indiana which were treated with Sevin, undiluted technical malathion was used exclusively. Treatments were extended to include grasslands and the borders of grainfields so that no important residual beetle infestations remained in the adjoining infested areas.

The malathion formulations and rates of application using a new low-volume spray technique were developed by the Methods Improvement staff. An initial dosage of 8 ounces per acre was subsequently reduced to 5.3 ounces per acre with no loss in effectiveness. In heavily infested areas, beetle populations dropped from 800 per hundred sweeps to none per hundred sweeps following application of the insecticide.

Personnel operating out of the methods improvement laboratory at Niles, Michigan, concentrated their efforts on developing treatments to expedite certification and movement of hazardous materials from the regulated areas. Studies were continued to determine the mortality of adult beetles in various commodities following normal harvesting and processing or storage as a basis for certification. In order to overcome the problem of fumigating hay and straw at low winter temperatures, a method of heating these commodities in railroad cars and trucks to a minimum of 40° F. prior to fumigation was devised. In addition, a micronized insecticidal dust treatment was developed and approved for use in empty freight cars and trucks to prevent spread.

Cereal leaf beetle research by State personnel included extensive field testing in Indiana and Michigan to evaluate aerial and ground applications of insecticides. In Michigan, studies were conducted to determine sources of resistance and varieties of grain. More than 31,000 lines of wheat, oats, and barley were included in these tests. Also studied was the seasonal abundance of different stages of the cereal leaf beetle and the effect of various physical environmental factors upon its life stages. In Indiana, aerial trapping studies were continued to determine if and when mass flights of cereal leaf beetle adults occur, and to collect data on conditions stimulating flight. Ohio State personnel field tested a number of candidate lures supplied by the Entomology Research Division, as well as specially prepared plant extracts, for attractancy to adult cereal leaf beetles.



Helicopters have advantages under certain conditions in plant pest control. They are used for small field work and where surrounding obstructions make it difficult to obtain good coverage with fixed wing aircraft.

CITRUS BLACKFLY

Since this pest was eradicated from the Rio Grande Valley of Texas in 1956, control work south of the border in Mexico has prevented the citrus blackfly from becoming re-established in the United States. These activities include the use of chemical control treatments to prevent northward spread from areas in Mexico near the United States border, biological control in areas removed from the border, and strict enforcement of quarantine regulations.

Citrus areas in the States of Tamaulipas, Nuevo Leon, and Baja California are kept free of citrus blackfly by application of insecticides to incipient infestations. South of these States, parasites are released to maintain control. This is designated as the biological control zone.

Over 88,000 trees were inspected in the United States in fiscal year 1964 without finding a positive specimen, and more than 1,164,000 trees were checked on 17,822 properties in Mexico. Only 15 infested trees were found on five properties in the chemical control zone. Chemical treatments were applied immediately, and no additional specimens were found.

In the biological control zone, 12,547 trees on 370 properties were found infested. Parasites were released as needed to contain these infestations.

EUROPEAN CHAFER

The European chafer continues to spread locally beyond the boundary of the generally infested areas. New infestations were found in New Jersey and the pest was discovered for the first time at Erie, Pennsylvania. The new infestation is particularly important because its location makes it a possible source for further spread to Ohio and other Midwestern States.

The effective use of blacklight and lure traps developed under the methods improvement program has increased survey effectiveness and was responsible for the discovery of the new infestations. During the year, approximately 6,407 additional acres were found infested--50 in Connecticut; 1,152 in New Jersey, 4,555 in New York; and 650 in Pennsylvania. Reports of damage were received this year from New York and Canada, reemphasizing the potential of this pest.

All the new acreage was treated in New Jersey and 1,569 acres were treated in Pennsylvania. This, plus the acreage treated in New York at isolated infestations and transportation sites where a hazard of spread existed, made the total treated for the year about 2,700 acres. The quarantine was extended in Connecticut and New York to bring in additional infested areas. The Capon Bridge area of West Virginia, is still free of the pest four years after the eradication treatment, and has been removed from regulation.



European chafer turf damage, City of Geneva Ontario County, New York.

GOLDEN NEMATODE

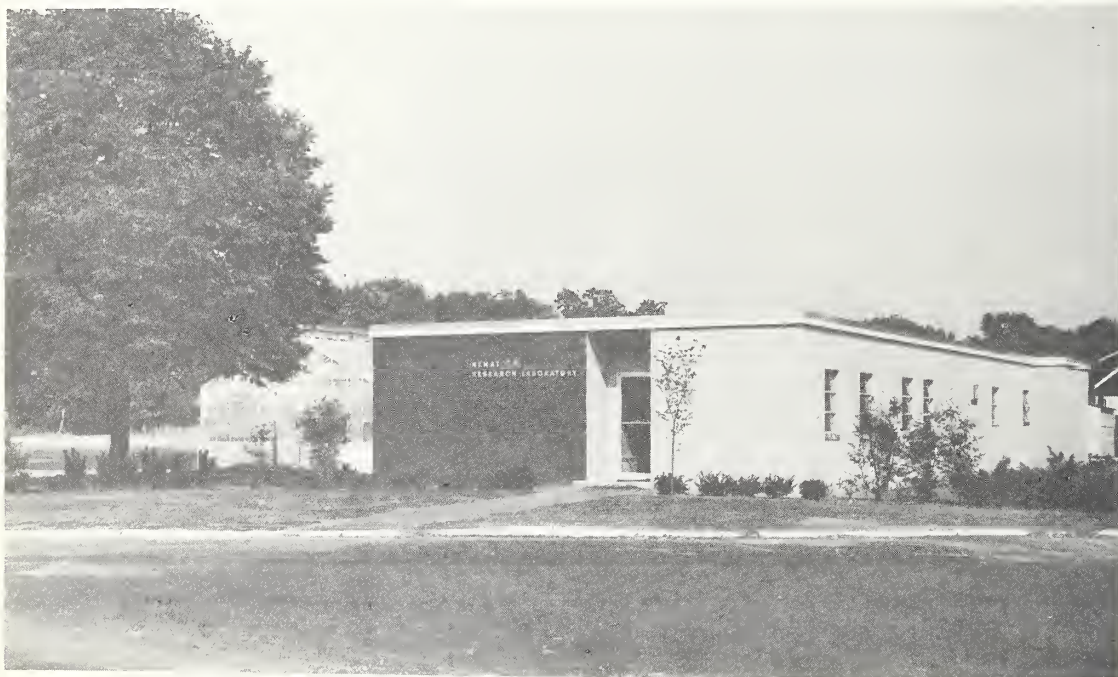
An additional 498 acres of nematode infested land were treated this year on Long Island, New York, in the continuing effort to eradicate the golden nematode in the United States. An aggregate of 3,015 acres has now been treated and the land has been made available for potato production.

Since golden nematode was first discovered on Long Island in 1941 a total of 16,568 acres has been found infested in Nassau and Suffolk Counties, Long Island, New York. This is the only known infestation in the United States. Of this total about 10,500 acres have been premanently removed from agriculture by real estate developments, leaving approximately 3,000 acres available to agriculture which still require treatment.

Surveys are conducted annually within the generally infested area. All other potato lands on the remainder of Long Island are surveyed on a three-year rotating basis. However, this will be changed to a two-year rotation starting in fiscal year 1965 to provide for earlier detection of incipient infestations. In addition to the work conducted in New York, surveys are made periodically in six other potato-producing States.

Research on the golden nematode is a responsibility of Cornell University. Very encouraging progress has been made in the development of a commercial variety of potato resistant to the golden nematode. Plant breeders have three selections which show resistance to the golden nematode and to several other major diseases. Small quantities of seed stock were furnished foundation seed growers in New York State for field testing during the summer of 1964. It is expected that these selections will be placed in the hands of New York seed growers for increase during the summer of 1965.

The Division continues to cooperate with the New York State Department of Agriculture and Markets with the enforcement of quarantine regulations to prevent spread of the nematode to other fields on Long Island and to other potato-producing areas of the country.



Cornell University's new Nematode Research Laboratory
Farmingdale, New York

GRASSHOPPER AND MORMON CRICKET CONTROL

Between 1951 and 1964 almost all grasshopper control work on Federal-State cooperative programs was accomplished through the application of chlorinated hydrocarbons. Aldrin at the rate of 2 ounces per acre or dieldrin at 1/2 ounce per acre was mixed with fuel oil and applied at the rate of one gallon per acre. These chemicals were very effective. However, the residue problem associated with the use of chlorinated hydrocarbons on the range presented a difficult livestock management problem which in some cases could not be overcome. There was an urgent need for an insecticide that did not have the undesirable features of these chemicals.

During 1963, techniques were developed whereby undiluted technical malathion applied by aircraft at the rate of 1/2 pint of total material per acre could effectively replace the chlorinated hydrocarbons applied at one gallon per acre for grasshopper control. Although this amount of malathion was still more expensive than the chlorinated hydrocarbons, the reduction in volume applied per acre greatly reduced application costs and the total cost of control therefore was comparable to the cost of the hydrocarbons formulations.

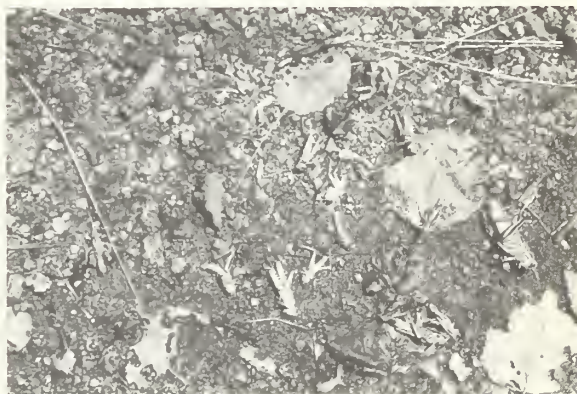
Due to the encouraging results obtained from field tests using technical malathion in the summer of 1963, this material and the low volume application technique were recommended for use on cooperative Federal-State programs in crop year 1964. This insecticide was applied without hazard to man and it was not necessary to remove livestock from rangelands being treated to avoid undesirable residues. This treatment proved to be very effective and was entirely acceptable to the ranchers and State cooperators as well as to wildlife interests. It was found that under certain conditions malathion can be toxic to bees, but this can be overcome by special handling of the colonies during spraying operations.

During fiscal year 1964, 15,696 acres were treated with ground equipment and 611,413 with aircraft.

Careful surveillance of Mormon cricket breeding grounds and the previous treatments of isolated infestations each year has resulted in continued low populations of this insect. No treatment of Mormon crickets was required in fiscal year 1964.



Melanoplus bivittatus nymph molting
on alfalfa plant, Boise, Idaho.



Dead grasshoppers 6 hours after
malathion spraying, Boise, Idaho.

GYPSY MOTH

Aerial defoliation surveys during the summer of 1963 disclosed a continued buildup of gypsy moth infestation and defoliation damage in New York and five New England States. Damage to forest areas was particularly severe in northwestern and central Connecticut; the Quabbin Reservoir area of Massachusetts; the southwestern corner of New Hampshire, and an area west of Equinox Mountain in Vermont. Defoliation also occurred in New York and Maine.

Gypsy moth chemical control treatments under the cooperative Federal-State program during the 1964 season included work in northern New Jersey; along the periphery of the generally infested area in New York, and in Pennsylvania along the New Jersey border. All known infestations in Pennsylvania were treated. No treatments were required in Michigan since there were no trap catches in that State in 1963. Total acreage treated in the Federal-State program in 1964 amounted to 79,395 acres, 41,840 of which were in New Jersey; 19,195 in New York; and 18,360 in Pennsylvania. The insecticide, Sevin, was used exclusively.

In addition to chemical treatments for gypsy moth, about 800,000 domestic egg and larval parasites were collected in New England and distributed at sites of infestation in New Jersey and Jefferson County, New York. The latter is an isolated infestation about 100 miles west of the generally infested area.

In addition to the control treatments carried out as part of the Federal-State programs, more than 87,000 acres within the generally infested area were treated by the States of New York, Rhode Island, Connecticut, Massachusetts, and Vermont. Both DDT and Sevin were used. Control activities in New York and Rhode Island accounted for nearly 75,000 of the total acreage treated. Control treatments in Rhode Island for the most part consisted of roadside spraying with DDT by means of ground equipment. Also, approximately 2,000 acres in Canada's Quebec Province along the New York and Vermont borders were treated with Sevin by the Plant Protection Division of the Canada Department of Agriculture.

In the search for alternate methods of gypsy moth control, methods improvement activities at the Falmouth, Massachusetts, laboratory included:

- the release of three species of gypsy moth parasites imported from Spain under provisions of Public Law 480 program in several heavily infested areas of southern Connecticut for colonization purposes;
- the collection and propagation of native gypsy moth parasites and predators and subsequent release in lightly infested isolated areas to ascertain their value as control agents;
- laboratory and field tests to develop and adapt for practical use the sterile-male release technique using male gypsy moths rendered sterile by both gamma radiation and chemosterilants;
- tests with gyplure produced by the Pesticide Chemicals Research Laboratory at Beltsville to determine its possible use for gypsy moth control. The lure was employed in a saturation trapping program in New Jersey, New York, and Pennsylvania, involving more than 90,000 specially designed traps dispersed from aircraft at prescribed intervals with the object of annihilating or drastically reducing the male moth population in given areas. In addition plans also were made to apply gyplure in liquid and granular formulations by air to isolated infestations in an attempt to confuse male moths and thus discourage mating;
- laboratory tests with the gypsy moth polyhedral virus alone and in combination with various candidate stress agents. In anticipation of future tests, Division and cooperating State personnel during the summer of 1963 collected 16 gallons of virus-infected gypsy moth caterpillars which later yielded approximately 120 trillion virus polyhedra;

- tests with another microbial insecticide, Bacillus thuringiensis, were deferred pending development of more suitable formulations. Several components of commercially available Bacillus thuringiensis formulations have been found to have a deleterious effect upon the bacterial spores and crystals, the principle killing agents; and
- aerial field tests using undiluted technical malathion as a possible replacement or supplement of the insecticide currently used for gypsy moth control.



An island in Quabbin Reservoir (central Massachusetts) showing almost complete defoliation. Spring 1964.



Trap showing plastic end with fingered baffle in place.



View toward rear of airplane showing hopper of electrically operated dispenser being loaded. Over 3,600 traps, prepackaged for easy handling in cartons of 63 each, can be carried per trip. Traps were dropped on two grid patterns of 1/16 and 1/8 mile.



Trap on ground after falling from aircraft.

HOJA BLANCA

Hoja blanca, a serious disease of rice which is spread by an insect vector, a planthopper, (Sogatia orizicola, Muir), was first found in the United States in Florida in 1957. One year later it was found in Mississippi, and, in 1959, it was found in Louisiana.

Eradication treatments were promptly applied to each of these infestations. Surveys during 1960 and 1961 failed to reveal any evidence of the vector or disease. In 1962 the vector was collected in Louisiana, but no evidence of the disease could be found. However, treatments were applied to destroy the vector. In late June of 1963, both the vector and disease were again found in Florida. Eradication was undertaken immediately on 1,080 acres.

Approximately 5% of the rice-growing areas are surveyed annually. If either the vector or disease is found, inspection is increased to about 20% of the rice acreage around the infested area. In the States of Arkansas, Florida, Louisiana, Mississippi, Oklahoma, and Texas, 207,557 acres were surveyed during the fiscal year 1964.

Through a cooperative Federal and State production and selection program some lines of rice have been developed that have resistance to hoja blanca. These lines have the same plant and grain characteristics as Bluebonnet 50--a long grain commercial variety popular in Louisiana. The resistant lines are now being field tested.



Normal head at left and right.

IMPORTED FIRE ANT

This is the second year that mirex has been used as the principal insecticide on the imported fire ant program. Because of the demonstrated effectiveness of the bait and the elimination of many of the problems that were associated with the program when a more persistent pesticide was used, there has been increased interest and participation in the program.

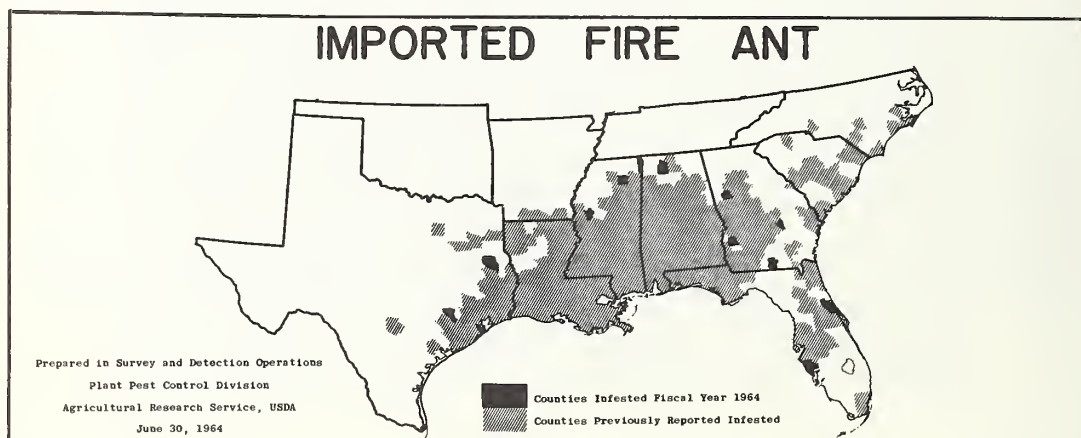
There is no longer a problem of residues on food and feed crops or a hazard to fish and wildlife. This permits the treatment of large acreages without flag-out areas. Special emphasis is being directed to aerial application phases of the program in an effort to reduce costs and increase the number of acres treated. It has been found that the bait material can be applied satisfactorily in wind velocities exceeding those which normally limit the application of clay granules.

During the 1964 fiscal year, 2,059,831 acres were treated with the initial application of mirex bait, 170,811 acres were given the second treatment. The total number of acres treated is more than any other previous year since the program began. In addition a second application of heptachlor was applied to 113,345 acres in 1963 to complete work previously started. Since the beginning of the program more than 7.5 million acres have been treated.

Detection and delimiting surveys were conducted during the winter season when vegetative cover is light. New infestations found were for the most part intermingled with or adjacent to known previous infestations, and there was no long-distance spread.

The methods improvement laboratory at Gulfport continued its efforts to learn more about the fire ant and its control. Alternate insecticides are being investigated, including the formulations of the bait to prolong its effectiveness in the field. New treatments for regulatory and certification purposes are also being explored. Studies are underway to learn more about trail-finding scents apparently used by fire ants. Evaluation studies are being made with respect to the number of applications needed and timing of treatments.

Methods improvement activities undertaken at the Gulfport laboratory included field tests to evaluate the effectiveness of various concentrations and application rates of mirex bait, and to study the effect of multiple applications of the bait. Also, acceptance tests were conducted in the laboratory with candidate carriers of mirex bait and various new compounds were screened as soil residual toxicants. In a continued effort to isolate and identify the imported fire ant trail-finding substance methods improvement personnel at Gulfport developed a screening procedure to evaluate various fractions extracted from the ants by Agricultural Research Service scientists.





Imported fire ant mound showing honeycomb-like structure formed by the passages in which the colonies live and raise their brood.

JAPANESE BEETLE

The results of the cooperative Federal-State program to eradicate a Japanese beetle outbreak in the Sacramento area of California continued to be encouraging during fiscal year 1964. The last specimen of the pest was collected in June 1962. A total of 14,511 acres has been treated since the beetle was first found there in June 1961.

The airport soil treatment program has reduced the incidence of aircraft transporting live beetles. Only two airports were declared hazardous during the 1964 flight season. Micronized DDT dust was applied to any aircraft leaving these hazardous airports.

The Japanese beetle summer quarantine was instituted in 1958 and has continued each year since then. Certificates are not required for the commodities or articles affected by these seasonal regulations. However, this does not lessen quarantine effectiveness against adult beetles, but it has made it possible for inspectors to give more attention to locating and appraising infestations and related hazards of pest spread. Approved surface treatments for nurseries were instigated during the year. This has provided the nurseryman an additional means to certify his stock and has relieved the inspector of the necessity of supervising individual plant treatments.

During the 1964 flight season 65,592 traps were operated in 34 States to locate new infestations and determine the extent of spread from the generally infested area. No new long-distance spread of the pest was discovered in 1964. New infestations were discovered on the periphery of the general infestation. Among the more important of the new infestations were those at Battle Creek and Detroit, Michigan, and Mattoon and Charleston, Illinois.

Since July 1, 1963, insecticide was applied to 22,851 acres in Michigan; 5,205 in Illinois; 1,109 in Ohio; and 6,597 in Tennessee in support of the State and Federal quarantines. Additional areas treated at other hazardous locations gave a total treatment for the year of 39,159 acres.

Various candidate insecticides were screened for effectiveness against Japanese beetle larvae by research scientists at Moorestown, New Jersey, in the search for possible substitutes for the chlorinated hydrocarbons. The principle of sterility as a means of control was also investigated in preliminary tests using some of the more commonly available chemosterilants. Refinements were made in the bioassay procedure developed for the purpose of analyzing insecticide residues in nursery soils for compliance with Japanese beetle quarantine requirements. This is now the responsibility of Plant Pest Control Division. For the past 4 years research scientists at the Peoria Utilization Laboratory have been carrying on a large-scale research program in an effort to find a way to mass produce the milky disease of the Japanese beetle and European chafer on artificial culture. The problem has been more difficult than was first anticipated. However, there is confidence that the problem will be solved and research is continuing.

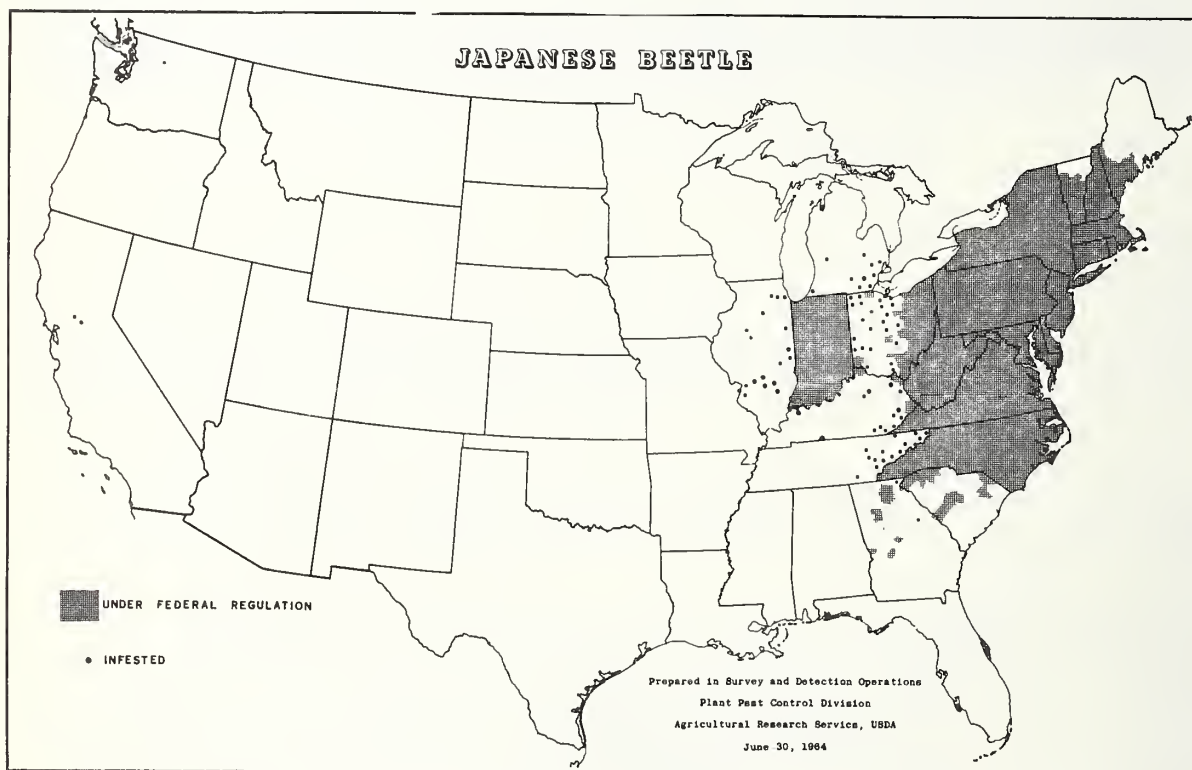
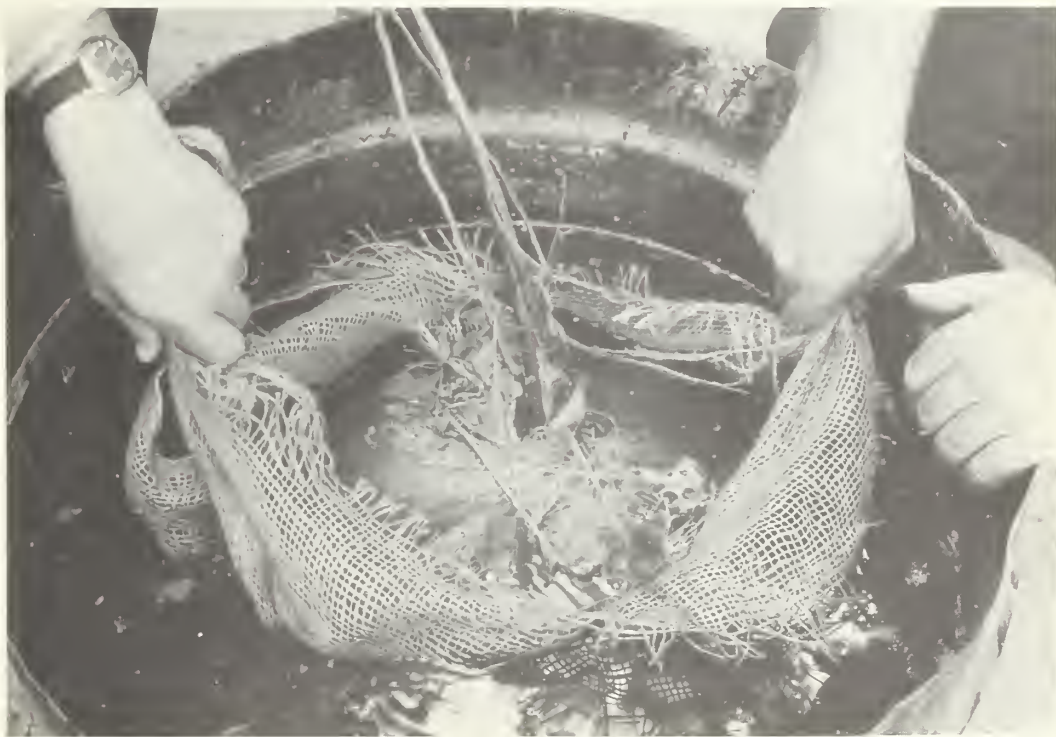


Illustration of some methods used in treating commodities to meet certification requirements under State and Federal quarantines.



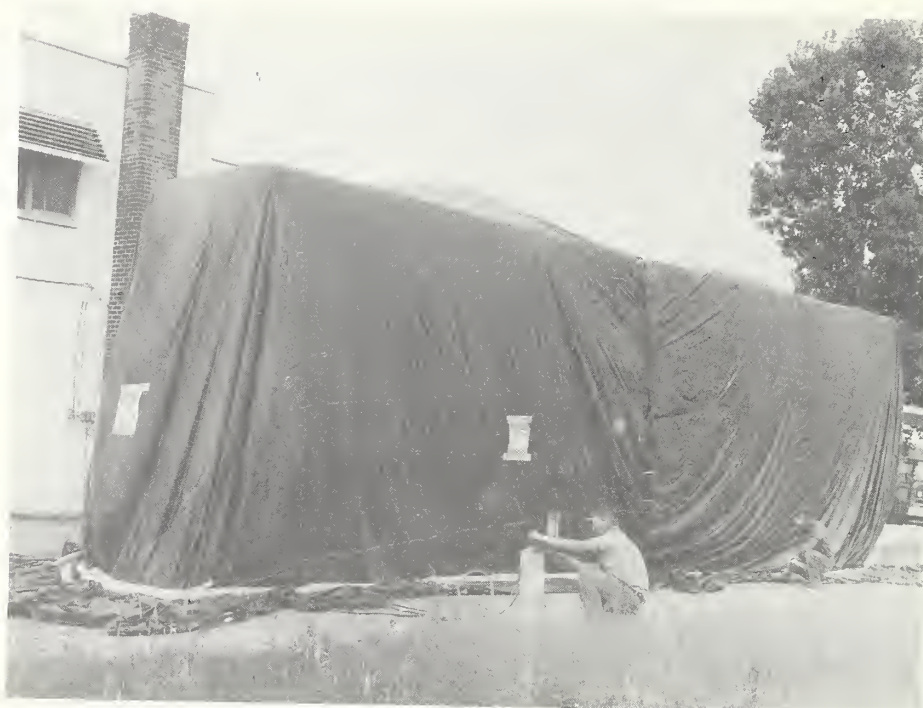
Mechanically dipping plants in large nursery.



Hand dipping plants in small nursery.



Steam treating potting soil.



Methyl bromide being injected under gas tight tarpaulin. Operator measuring correct amount of fumigant and checking for leaks with halide detector.

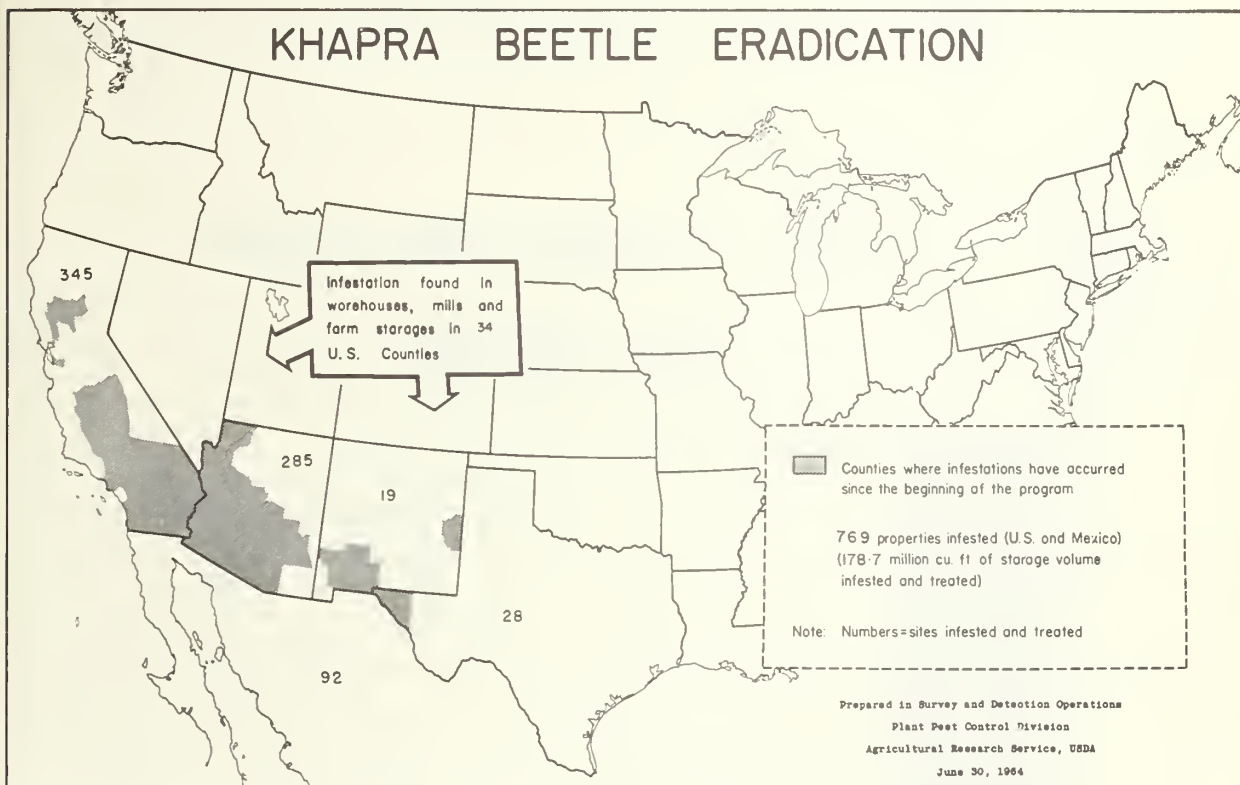
KHAPRA BEETLE

After a period of 20 months, since an infestation had been found in the United States, surveys in March 1964 revealed a new infestation in a feed mill at Yuma, Arizona. A total of 4 infested properties was found, all traceable to this feed mill. These were treated and the last premise was released from Federal and State quarantine regulations on June 26, 1964.

No khapra beetles have been found in New Mexico since May 1959; in Texas since 1960; in Mexico since July 1961; however, a suspect specimen was found in September 1963 and some regulatory work was done as a precautionary measure. The last infestation in California was found in January 1962.

This past year detection surveys for khapra beetle were conducted on 17,961 properties in 32 States in the United States and 9 States in Mexico. A total of 368 interceptions of khapra beetles was made at ports of entry during fiscal year 1964. Intensive surveys are being continued in the United States and Mexico.

Since 1955, 769 properties involving 204 million cubic feet have been fumigated in Arizona, California, New Mexico, Texas, and the Republic of Mexico to eradicate the beetle.



MEDITERRANEAN FRUIT FLY

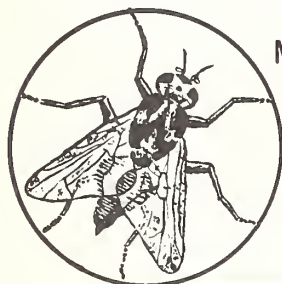
The extensive trapping program for the Mediterranean fruit fly, which has been continuous since 1962, was responsible for the discovery of this important pest shortly after it entered Florida for the fourth time, in June 1963, near the Miami International Airport. Because this infestation was detected promptly, State and Federal personnel were able to initiate a regulatory and eradication program before the pest had become widespread. Prompt action wiped out this

infestation in 5 months by the treatment of an aggregate of 72,565 acres, of which 69,473 was done in fiscal year 1964. The last specimen, a male fly, was found on August 28, 1963, at El Portal, Florida, which is near Miami. The last insecticide was applied in October 1963.

On November 26, 1963, following a period of 90 fly-free days, State and Federal regulations imposed under the Mediterranean fruit fly quarantine were lifted. Detection efforts were continued by the use of over 29,000 traps in and around Florida ports. On May 20, 1964, a single male fly was trapped not far from the dock area of Miami. Trapping in the area was intensified and, since no additional flies were recovered, no treatment was applied.

The Mediterranean fruit fly has increased both in intensity and in area in Central America. Because of modern highways and increased travel, this is a distinct threat to the citrus area in Mexico. If the fly should become established in Mexico, it would be difficult to prevent its entry into the United States. To obtain early evidence of any spread, the United States and Mexico maintains, approximately 2,000 traps at the border area of southern Mexico.

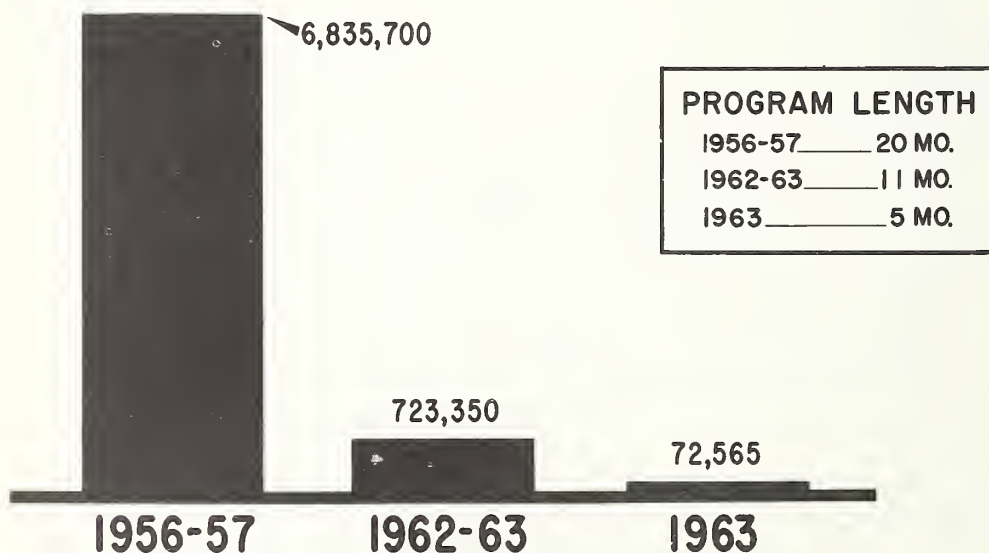
Tests were continued in cooperation with ARS scientists in Hawaii to evaluate the efficacy of lures employed in conjunction with the Florida trapping program. Likewise, the lack of knowledge regarding the performance of trimedlure, while in crystalline form, prompted a series of bioassays in Hawaii to determine its performance under varying temperature conditions. Trimedlure is not only attractive to the Mediterranean fruit fly, but to the natal fly as well.



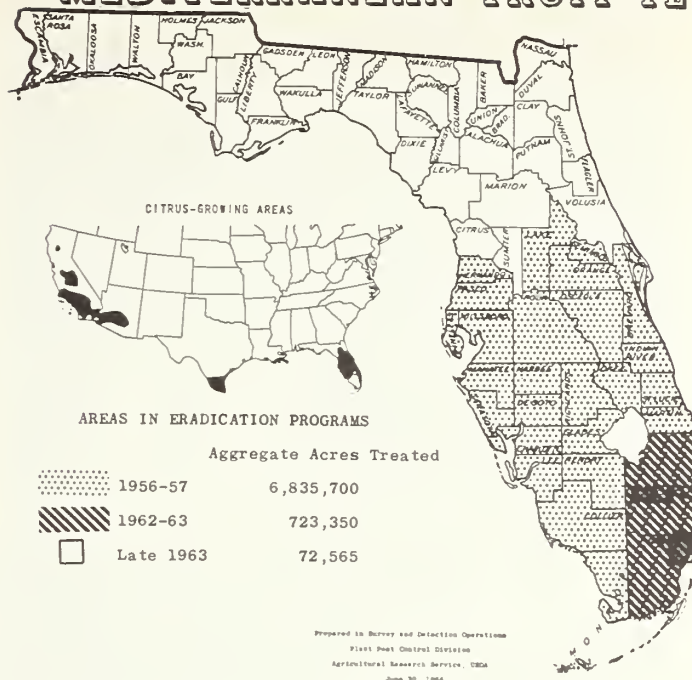
MEDITERRANEAN FRUIT FLY

EARLY DETECTION PAYS

ACRES TREATED



MEDITERRANEAN FRUIT FLY



MEXICAN FRUIT FLY

The Mexican fruit fly is established throughout much of the citrus area of Mexico. The fly migrates each fall and winter into southern Texas where it infests citrus in the Rio Grande Valley. During fiscal year 1964, 162 specimens were found infesting 468 acres on 38 properties in the Valley. At the beginning of each migration season, quarantine procedures are invoked and all fruit moves under regulation from infested Texas counties to other citrus-producing areas to prevent spread of the infestation. Currently, spread of the Mexican fruit fly into western Mexico constitutes a threat to citrus production areas in the western United States. A cooperative spray program in Mexico adjacent to the California border, plus strict quarantine measures, has kept western citrus areas free of the pest. One fly was trapped in San Ysidro, California, July 1, 1963, the first catch in the area since 1957. Several flies were also trapped near the border in Mexico. These areas were treated promptly.

During fiscal year 1964 the State of California applied protective insecticide treatments by air to maintain a barrier zone along the Mexican border from the Pacific Ocean eastward into the mountains. For the first 5 months in fiscal year 1964, 174,104 known infested host trees were treated every 3 weeks with a security zone of 1 to 3 blocks in Tijuana, Ensenada, and Tecate, Baja California. One chemical treatment was made early in April 1964.

The sterile male release of Mexican fruit flies was begun on April 23, 1964, in the Tijuana, Baja California area after one chemical spray was applied to the infested and surrounding blocks of that city. Through June, a total of 613,926 sterile male flies, *Anastrepha ludens*, was liberated in 8 releases in the control zone at Tijuana. During April, May and June 1964, 13 native flies were captured in Baja California, compared to 7 for the same months in 1963. These differences in catches may be considered insignificant for this short period. The sterile fly technique appears promising, since this method eliminates the use of chemicals. It also does away with inconveniences to the Mexican property owners where, in many instances, it was necessary to drag hoses through their homes to apply the chemical to backyard host plants.



Liquid lure placed in glass trap to attract the Mexican fruit fly. Traps are suspended in host trees.

PHONY PEACH AND PEACH MOSAIC

The cooperative phony peach and peach mosaic programs have permitted profitable commercial peach production in areas where the diseases are present. The low level of infection reached on the phony peach program in the last several years continues at about the same rate of incidence. During the year 5,962,229 peach trees were inspected with only 0.20% or 11,783 trees found infected. In 1963 the infection rate was 0.22%. The ability to hold this low level of infection is attributed to several factors, some of which are: (1) the effective removal of infected trees; (2) the destruction of wild plum, a carrier of the disease, when found in the environs of peach orchards; and (3) the enforcement of Uniform State Quarantines regulating peach nursery stock.

The peach mosaic rate has declined in fiscal year 1964 to 0.01% from a high of 4.16% in 1935. During the year, 3,150,712 trees were inspected and 312 were found infected. The success of this program, as demonstrated by the lowered incidence, is particularly due to the (1) delay of inspection until late in the season which assures locating all of the trees evidencing symptoms of mosaic; (2) prompt removal of infected trees; (3) removal of tolerant varieties which have served to mask the infection; and (4) discontinuance of infected twig clipping by growers in advance of the inspection crews.

PINK BOLLWORM

Even though the pink bollworm situation early in the 1963 crop season continued to look very encouraging, surveys that fall showed that pink bollworm populations increased substantially in Louisiana and Arkansas. In Louisiana, only 31 pink bollworms were found in 4 parishes during the fall of 1962. Pink bollworms were discovered in 17 parishes in 1963, with positive specimens recovered totaling

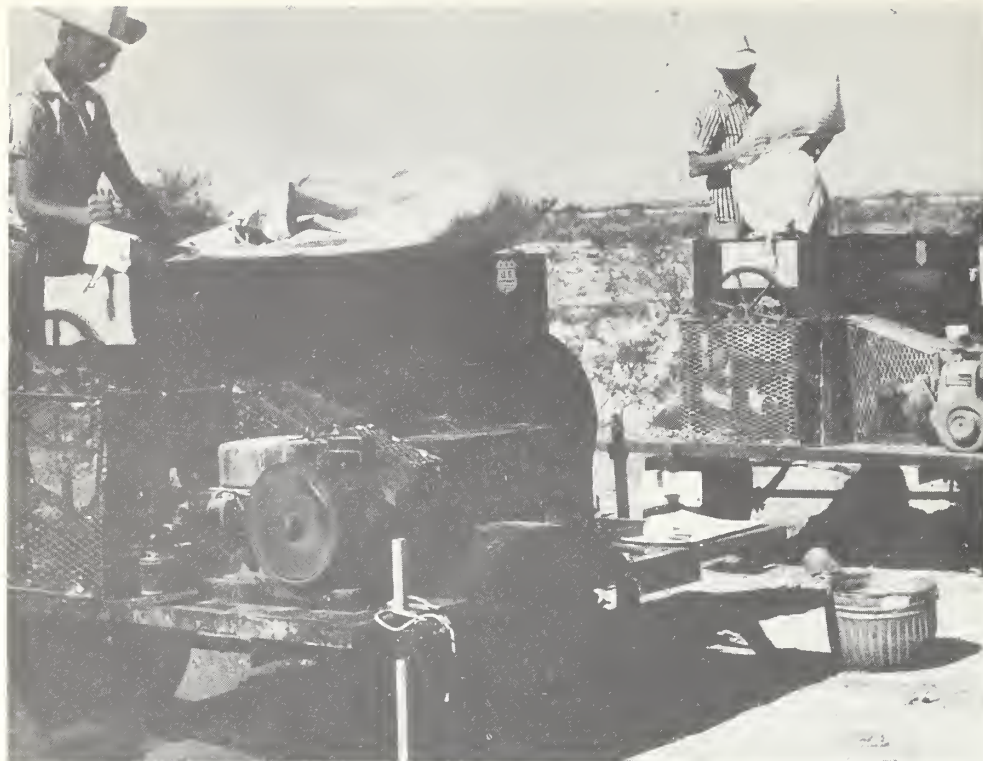
1,299. In Arkansas, only 2 pink bollworms were found in 2 counties in 1962. At the end of the survey season, in the fall of 1963, 295 pink bollworms had been found in 21 counties of that State.

A similar increase occurred in Arizona. In January 1964, a pink bollworm larva recovered from gin trash was traced to a 164-acre field of short staple cotton near Continental, Arizona, the first recovery of pink bollworm in Pima County since the fall of 1960. Recoveries of pink bollworms in the central Arizona eradication area brought the total infested acreage in fiscal year 1964 to 4,350 in 80 fields. Positive specimens totaling 4,018 were found in 6 Arizona counties, with 136 recoveries in the counties of Maricopa, Pima, and Pinal.

The recently discovered pink bollworm lure was used experimentally in the Arizona survey during the 1963-64 season. This new survey tool proved so effective that it has virtually replaced light traps in that State. Since this natural lure is produced in such small quantities at the Brownsville laboratory, the use of such traps in other States must, of necessity, be limited at this time.



Pink bollworm larvae recovered from trash after it was screened through the gin trash machine.



Gin trash machines are the best method of survey for the pink bollworm.

SOYBEAN CYST NEMATODE

The soybean cyst nematode continues to be an important pest problem in 8 States where it is known to exist. Economic losses were observed in Arkansas, Missouri, North Carolina, and Tennessee during fiscal year 1964. Soybean cyst nematode surveys are being continued in all of the major soybean-producing States with particular attention given to those areas where soybeans are grown year after year on the same land. New infestations amounting to 46,327 acres were found in the previously known infested States. As of June 30, 1964, based on soil surveys, 133,337 acres were known to be infested in Arkansas, Illinois, Kentucky, Mississippi, Missouri, North Carolina, Tennessee, and Virginia. However, survey personnel estimate the total infestation pattern at about one-half million acres.

The Division cooperated with the Crops Research Division, ARS and Experiment Stations in Arkansas, North Carolina, and Tennessee, in the evaluation of the NC55 black-seed resistant soybean as compared to the susceptible Lee variety. Field trials were conducted in the 3 States. The beans were planted on heavily infested land to evaluate their resistance and to determine whether resistant plants reduced nematode populations under different environmental conditions. The results of these cooperative field tests indicated that the NC55 variety is highly resistant to the soybean cyst nematode. In North Carolina, NC55 out-yielded the Lee variety 4 to 1. The NC55 also produced substantially more beans than the Lee variety in the Arkansas and Tennessee plots.

Plant breeders now have a yellow-seed selection with resistance to the soybean cyst nematode. However, it will take approximately 3 years to increase the seed for large-scale field testing.



Test plots in Pender County, North Carolina - 1964
Lee Soybeans, left - NC55, right

SURVEY AND DETECTION OPERATIONS

The Survey and Detection Operations program involves: (1) Program surveys, and (2) the Cooperative Economic Insect Survey.

The Survey and Detection Operations staff participate in planning and coordinating field activities. Surveys are conducted under 23 cooperative Federal-State programs. The data are evaluated and maps are prepared to show the status of program pest conditions in the infested areas of the United States. This information serves as a basis for control and regulatory operations.

The Cooperative Economic Insect Survey program is a cooperative Federal-State undertaking to determine and report the abundance and distribution of economic insects. Agricultural agencies and interested workers in the 50 States, the territories, and several foreign countries cooperate in this work. In 1964 over 1,500 reports of insect conditions were received through the State survey coordinators. More than 1,200 agricultural workers contributed to these reports each week during the reporting period. The Cooperative Economic Insect Report, a nationwide compilation of reports from the field observers, is mailed to approximately 3,500 individuals each week in the United States and foreign countries.

Qualified observers, who report on local insect conditions, constitute a nationwide network of people who watch for and report newly introduced insect pests and the movement to new areas of pests that are established in this country. Economic insects of foreign origin continuously threaten American agriculture, however, no new major pests were discovered during the fiscal year. The movement of people and their conveyances is the principal way by which new insect pests are introduced. Most immigrants are stopped at the ports of entry by Plant Quarantine Inspectors. Indicative of the pressure of this threat is the fact that in the last fiscal year, 175 million people, an increase of 15 million, passed through U. S. ports of entry. The occurrence of newly established species was reported for the first time in 44 States and 77 counties. Cooperatively financed survey entomologists are employed in 25 States.

SWEETPOTATO WEEVIL

Renewed emphasis has been placed on the sweetpotato weevil program, since the January 1962 freeze reduced the population to the lowest level in the history of the program. During the 1964 fiscal year, more than 5,000 acres were treated by farmers using 2% dieldrin dust, in the 7 infested States. DDT was used principally under State supervision to treat 809,603 bushels of sweetpotatoes in storage.

The eradication program in South Carolina has reduced the weevil population to a bare survival level. One area in South Carolina has been removed from State regulations after 3 years of negative inspection. Good progress was made on the program in Georgia this year where only 41 active infestations are known to exist. Spread in Alabama has been limited, for the most part, to dooryard plantings in some of the large towns, and the commercial areas are still relatively free of weevil infestation. In Louisiana, new infestations were found in 3 of the eradication parishes. There are now 410 properties in the State receiving eradication treatments.

Infestations were found in 14 counties in Mississippi, previously known to have sweetpotato weevil infestations. Nine counties were found infested this year in Texas, as compared to eight counties last year. All of south Florida is now considered to be generally infested.

WHITE-FRINGED BEETLE

Significant increases in white-fringed beetle populations occurred throughout the generally infested area. Along with this increase in population density, 39 new counties in 9 States were reported in the southeast.

The outlying infestation in Kentucky has been treated, and work is continuing in Arkansas in the 6 northeastern counties. In Virginia, the Norfolk infestation has been treated. Throughout the generally infested area, 49,448 acres were soil-treated to eliminate heavy infestations. Nursery regulatory treatments involved 13,824 acres. In heavily infested areas, 3,249 acres were treated with foliage sprays to reduce populations. Methods improvement efforts are being intensified to find more effective ways of dealing with this pest.

The white-fringed beetle quarantine regulations were revised to provide for suppressive areas within or adjacent to generally infested areas. This action will provide protection to areas being treated to eradicate the weevil by regulating the movement of host materials and other commodities into the area. A public hearing was held at Atlanta, Georgia, on January 23 to consider the extension of the white-fringed beetle quarantine to Arkansas and Virginia.



White-fringed beetle larvae found feeding on roots of fennel an important host plant. Most damage is done at this stage of development.



Peanut field damaged by feeding of white-fringed beetle larvae. Alabama - spring 1964

WITCHWEED

Witchweed occurs in 24 counties in North Carolina and 10 counties in South Carolina. These 34 counties are in a contiguous area of the eastern coastal section of the 2 States. During the year, additional infestations were found, but they were intermingled with or adjacent to those areas already known to be infested with witchweed. As of June 30, 1964, a total of 11,371 farms, comprising 262,457 acres, was known infested. Surveys were made in 21 other States.

During the year, eradication treatments using 2,4-D at the rate of 1/2 to 1 pound per acre were applied to an aggregate of 460,882 acres. Herbicide application work is done by commercial contractors under the supervision of Division personnel. The control work is timed so that witchweed is destroyed before seeds mature. Treatments begin on or about June 15 and continue until frost. During fiscal year 1964, no witchweed plants were found in 1,551 fields having a history of witchweed and which have received repeated treatments under the eradication program. Many fields, where damage from witchweed was almost complete before the eradication program, again produced a normal crop of corn.

Research and methods improvement scientists are continuing their investigations to learn more about witchweed and methods of control. Primary emphasis is on isolating and identifying the witchweed seed germination stimulant complex; developing herbicidal treatments for witchweed and wild host grasses in cotton, peanuts, soybeans, sorghum, and other crops; and, developing decontamination methods for killing witchweed seeds in soils, on crop products, equipment, and other materials.



Decontamination of equipment in witchweed area.

SPECIAL SURVEYS

Special surveys are conducted annually to provide outlook information for growers and industry on beet leafhopper, boll weevil, and potato psyllid.

The annual survey for beet leafhoppers which began in late January 1964 in the breeding areas of southern California revealed high populations on desert weeds where rainfall was ample for good host plant production. Populations were lighter towards Arizona, and limited in southern Arizona, although they averaged slightly higher than in 1963. Based on 2 desert surveys, the spring movement into the cultivated districts of Arizona, California, western Colorado, southern Nevada, and southern and eastern Utah was expected to be heavy. While movement into western Nevada and northern Utah was expected to be moderate to heavy.

Surveys in 45 counties in Texas and 7 in New Mexico began in February. Host plants were sparse in the El Paso Valley but higher than previous years in New Mexico. The number of beet leafhoppers per 100 square feet was 11 in Texas, and 32 in New Mexico, compared with 8.6 in Texas, and 6.7 in New Mexico in 1963.

Host plant surveys in Idaho in April revealed numbers above 1963 but lower than most other years since 1957. Cooperative surveys were again conducted in Washakie County, Wyoming, which resulted in control measures on 3,600 acres of wasteland surrounding beet fields in the Worland area, underwritten cooperatively by the Beet Growers Association and the Wyoming Department of Agriculture.

Boll weevil hibernation surveys in cooperation with the Entomology Research Division in the fall of 1963 in the Carolinas, Louisiana, Mississippi, and

central Texas revealed that the average counts exceeded those of 1962 in only one area of south-central South Carolina and in northeastern Louisiana. Counts in other areas were lower. Spring counts of surviving weevils in 1964 were generally higher than in 1963 except for a few sections in Alabama, the Carolinas, Georgia, Tennessee and central Texas. The 1964 survival average for all areas surveyed in Mississippi was 289 weevils per acre compared with only 19 in 1963. In northeast Louisiana, the 1964 counts averaged 1,049 weevils per acre compared with 121 in 1963. In the Coastal Plains area of North and South Carolina, counts were considerably higher than in 1963, but in the Piedmont areas of these States the counts were lower. In central Texas, the 1964 survey count was 97 live weevils per acre of ground trash compared to an average in 1963 of 452.

Early 1964 potato psyllid surveys in New Mexico and Texas revealed limited late seasonal host plants; however, average populations were much heavier than in 1962 and 1963, particularly in the Big Spring, San Angelo, and Del Rio areas of Texas. New Mexico populations were lighter. Unfavorable moisture conditions in Arizona and California reduced early seasonal host abundance and insect numbers. Small numbers of adults were found in Pinal County, Arizona areas in early February, but rapid increases were noted in late February. Populations over the Arizona-California area were generally lower than in 4 of the past 5 years.

PESTICIDE SAFETY AND MONITORING

To implement recommendations of the 1963 President's Science Advisory Committee report, Plant Pest Control Division instituted a formal monitoring program in fiscal year 1964 to assess the impact of Federal-State control and eradication programs on the environment. In the past, monitoring activities had been conducted on a less extensive scale as a part of regular program work.

The monitoring programs in 1964 included studies on water, soil, crops, fish, wildlife, beneficial insects, and other nontarget organisms. A large part of this monitoring effort was cooperative with other Federal and State agencies. In some instances, special technical assistance was arranged for on contractual basis with colleges and universities, including Michigan State University, Mississippi State University, Pennsylvania State College, Rutgers University, and the University of Wyoming. The Michigan State Department of Conservation accepted a contract to make studies on fish and wildlife in that State in connection with the cereal leaf beetle and Japanese beetle control programs.

The following cooperative control programs were being monitored on June 30, 1964:

- Burrowing nematode in Florida
- Cereal leaf beetle in Michigan
- Grasshopper control in Wyoming
- Gypsy moth in New Jersey and Pennsylvania
- Japanese beetle in Illinois and Michigan
- Witchweed in North Carolina and South Carolina

Following the reported fish kill in the lower Mississippi River in the spring of 1964, ARS established a study to determine the impact of normal agricultural pesticide use on the environment. This monitoring program, established in selected areas of the Mississippi Delta in Arkansas and Mississippi, involves 10 one-square mile study areas. Large-scale sampling operations on water, soil, crops, and nontarget organisms began in May. The chemical analysis work to support this program will involve from 14,000 to 16,000 determinations. Data

developed from the study will be useful to the Department in carrying out its responsibility in pesticide recommendations and regulations, and other considerations in the pesticide use field. The information will be made available to all agencies having an interest in pesticides.

Other important measures were taken during the year to further strengthen safety in pesticide use. Pest Control Liaison Officers were established in various Federal departments to improve communication between agencies interested in pesticide use. A national program to investigate agricultural pesticide accidents was initiated in November 1963. Results of investigations completed thus far indicate that misuse is the common cause of pesticide accidents. Special reports were developed for general distribution on the safe application of pesticides by aircraft, and safe disposal of unused pesticides and pesticides containers.



Sampling soil for residue analysis.



Pouring alcohol in pitfall trap for insect studies.

FOREIGN TECHNICAL ASSISTANCE PROGRAMS

Desert locust infestations in the Near East, Asia, and Africa remained at an alltime low during the past year. Only scattered locusts were reported in the areas where they have historically caused major destruction. The Regional Insect Control Project continued its intensive reconnaissance and survey program to locate any isolated infestations, and remained prepared to take immediate action in the event infestations were located. During the year, RICP pilots flew 726 trips involving 1,000 hours on reconnaissance and training. Part of this time was spent assisting the Desert Locust Control Organization of East Africa. As a result of the combined activities, the primary breeding areas in East Africa were surveyed more intensively than any year in the past without finding locust swarms that required intensive or large-scale control efforts.

Project entomologists are stationed in Afghanistan, Ethiopia, Iran, Sudan, and Turkey. Substantial progress has been made in the development of country capability to handle a wide range of pest control problems. A new program in Sudan promises to be interesting and a challenge to RICP. Sudanese participants in this program will begin basic pilot training and progress through advanced courses to become qualified agricultural pilots. Long range plans for this program will include participants from other African countries.

Technicians from RICP have participated in temporary duty assignments to provide technical assistance in aerial operations, survey, and quarantine programs. Several countries in the Near East, Asia, and Africa who have requested this assistance have expressed their appreciation for this help. More of this type of assistance is anticipated for the future.

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USE PESTICIDES SAFELY

- Apply only when needed.
- Handle with great care.
- Follow directions on the label and heed all precautions.
- Carefully dispose unused portion and the container.
- Improper use and disposal may jeopardize human health, domestic animals, desirable plants, honey bees and other pollinating insects, fish, and wildlife, and may contaminate water supplies.



COOPERATIVE PROGRAMS
PLANT PEST CONTROL DIVISION
CENTRAL REGION

FISCAL YEAR 1964

AGRICULTURAL RESEARCH SERVICE
United States Department Of Agriculture

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INTRODUCTION

The information contained in this report reflects the activities of the Central Region of the Plant Pest Control Division, Agricultural Research Service, U. S. Department of Agriculture, for fiscal year July 1, 1963 - June 30, 1964.

All services performed were accomplished on a co-operative basis with the thirteen states involved. Our principal cooperators included: State Departments of Agriculture, Labor and/or Conservation, State Extension Services, State Experiment Stations, and the Cooperative Rust Laboratory, St. Paul.

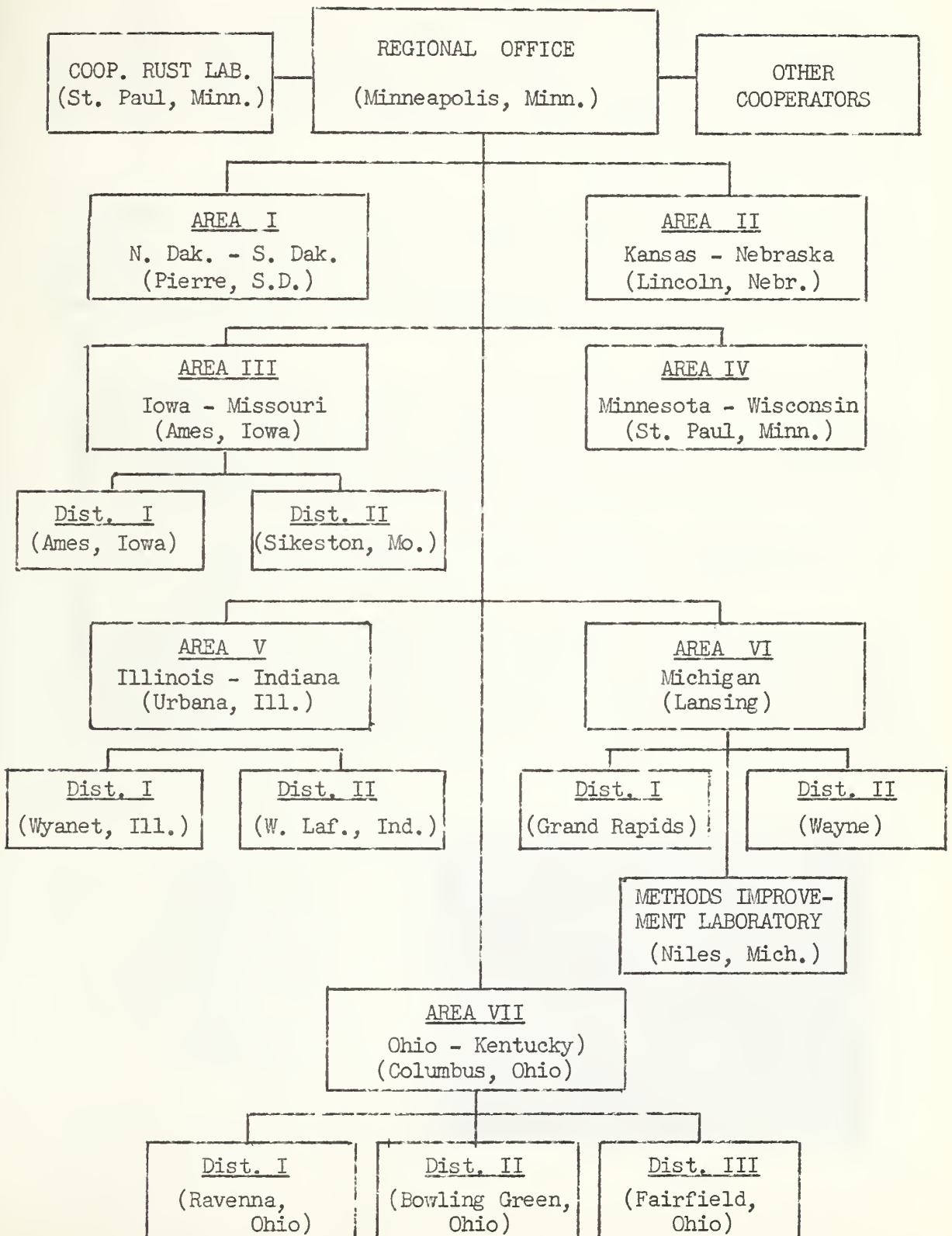
Other Federal agencies interested in our insect and plant-disease problems render aid and provide information in keeping with mutually determined limits at Division and Department levels.

Those segments of agriculture that benefit directly or indirectly by our cooperative efforts provide labor, money, space, services, etc., toward the success of the work.

The Crop Quality Council, farm organizations, groups, and individuals gave support to Plant Pest Control services in keeping with the purpose of their respective interests in the field of agriculture.

We especially appreciate the public support extended to the Division by the Crop Quality Council. This organization keeps current with the aims and goals of our programs affecting the grain and seed industries. Pertinent facts and information are relayed by them in letters, printed releases, and other media to their constituency and other interested groups.

ORGANIZATION



BARBERRY ERADICATION

Barberry eradication for the control of stem rust continued to make good progress in all states where active programs are in operation. Work plan adjustments in some states were necessary because of severe weather during the winter months. Shifting of work units to more suitable work sites was accomplished with minimum disruption of general field operations.

Rework during the year covered 1,493 square miles in extremely rough terrain, where barberry regrowth is and will remain a problem for some time. In Kansas, 893 square miles were inspected initially by the farmstead method. In this State there remain about 12 counties that will require initial farmstead inspection. Thereafter a follow-up of intensive rework will be necessary where escape plants have been found.

Again this year the number of fruiting bushes on previously infested locations was unusually large. In some instances reinfestations required a reevaluation of work needs by increasing the area to be covered. A total of 11,317 barberry bushes was destroyed on 747 properties, and 1,364 square miles were placed on maintenance.

In accordance with provisions of Quarantine 38, 206 nurseries and 43 dealers were approved during the 1964 fiscal year.

A review of the barberry eradication accomplishments indicates that several states are approaching the stage when serious consideration should be given to a maintenance program. The relatively small number of active infestations in some states should be reappraised, with the idea of devising a procedure to keep these areas on a more realistic rework schedule.



Large common
barberry found
growing in a
fence row adjacent
to a field of grain,
in a rework area
of the Central
Region.

PRESENT STATUS, PROGRESS, AND FUTURE REQUIREMENTS, 1918-1964

State	S q u a r e										M i l e s				P r o p e r t i e s						Barberry	Bushes	Destroyed
	Total in State to be Worked (2)	Number Covered			Number Requiring Work One or More Times			No. Re- quiring No Future Work (11)	Total Found to Date (12)	No. Need- ing One or More Rein- specimens (13)	Number Com- pleted (14)	Common	Native	Total to Date (17)									
		Farm- stead (3)	Inten- sive (4)	Farm- stead (5)	Inten- sive (6)	Farmstead Initial (7)	Intensive Initial (8)								Intensive Initial (9)	Intensive Initial (10)							
(1)																							
Illinois	56,043	56,043	34,679	4,659	8,041	0	0	0	687	55,356	20,070	2,454	17,616	2,661,485	89,781	2,751,266							
Indiana	36,045	36,045	27,329	8,405	3,533	0	299	14	188	35,544	7,016	725	6,291	200,081	212,118	412,199							
Iowa	56,167	56,167	44,594	4,832	13,580	0	120	273	3,607	52,167	15,929	4,614	11,315	1,330,109	125	1,330,234							
Kansas	32,831	23,720	0	0	0	9,111	0	0	331	23,389	409	409	0	6,416	1	6,417							
Michigan	57,481	57,481	26,637	17,096	11,892	0	0	0	1,064	56,417	19,506	4,450	15,056	6,748,536	16	6,748,552							
Minnesota	80,883	80,883	32,958	28,742	8,825	0	0	0	1,163	79,720	9,427	2,155	7,272	1,017,499	0	1,017,499							
Missouri	37,251	19,724	17,722	789	1,043	0	0	27	158	37,066	1,947	683	1,264	24,689	0	24,689							
Nebraska	77,268	77,268	36,832	34,966	7,448	0	0	0	412	76,856	4,957	237	4,720	149,339	0	149,339							
North Dakota	70,183	70,183	1,276	30,105	430	0	0	0	21	70,162	1,084	12	1,072	39,565	0	39,565							
Ohio	40,740	40,740	32,197	6,289	12,967	0	0	0	1,778	38,962	17,814	2,627	15,187	3,826,765	0	3,826,765							
South Dakota	76,868	76,868	12,906	4,538	1,546	0	0	0	208	76,660	1,574	87	1,487	136,493	0	136,493							
Wisconsin	54,852	54,852	21,314	23,886	12,620	0	0	0	2,788	52,064	18,173	4,473	13,700	5,735,522	0	5,735,522							
Totals	676,612	649,974	288,444	164,307	81,925	9,111	419	314	12,405	654,363	117,906	22,926	94,980	21,876,439	302,041	22,178,540							

Barberry Eradication Accomplishments - Fiscal Year 1964

State	: : Square : Miles : Surveyed	: : Old : Properties : Rein- : spected	: : Total : Properties : Infested	: : Nursery : Establish- : ments : Inspected	: : Total : Bushes : Destroyed
Illinois	103	229	12	31	29
Indiana	14	46	4	13	10
Iowa	490	416	78	9	1,418
Kansas	893	78	39	16	98
Kentucky	-	-	-	15	-
Michigan	192	860	220	29	2,722
Minnesota	136	185	46	54	758
Missouri	37	167	5	9	11
Nebraska	23	40	7	3	35
North Dakota	-	-	-	3	-
Ohio	220	479	194	52	4,663
South Dakota	15	11	2	8	3
Wisconsin	<u>263</u>	<u>445</u>	<u>140</u>	<u>7</u>	<u>1,570</u>
Totals	2,386	2,956	747	249	11,317



Treating large escape barberry with herbicide, using small hand sprayer.

Stem Rust*

Extensive winterkilling of cereals eliminated or drastically reduced the cereal rusts, which were unusually prevalent in the southern plains during the fall of 1962. Stem rust apparently did not survive the winter there and developed slowly in Texas during the spring. North of Texas, on the other hand, the rust appeared from one to two weeks earlier than usual, but in very light amounts and on an early crop. Hot weather and drought combined to force crop maturity and to slow rust development in the winter-wheat areas. Rust was widespread northward, however, extending into eastern Montana.

Slide exposures at 27 stations indicated spores in the air in much smaller numbers and later in the season than in 1962. The largest count on a single slide in 1963 was about half a million per square foot of surface as compared with about 2 million on several days the previous year. Results also indicated a westerly swing of spores in the air over the spring-wheat area, with stem rust on slides in eastern Montana at the rate of 361,000 on July 24.

The overall loss from stem rust on small grains was light in 1963 in contrast with 1962. An estimated 1-percent loss to winter wheat occurred in South Dakota and Montana, and there was no appreciable damage to any of the winter grains in most other areas. Damage to spring bread wheat was again negligible because the widely grown variety Selkirk was resistant to the prevalent races. Although some fields of Lee wheat were heavily rusted in northwestern North Dakota, aggregate damage to this variety was light. The new durum varieties Wells and Lakota also provided effective resistance to stem rust on about 85 percent of the durum acreage. The older varieties, however, were heavily attacked due largely to race 15B-2. As a result, loss to the durum crop was likely in excess of 3 million bushels, causing an estimated 7 percent loss in North Dakota and 1 percent in South Dakota.

Identification of physiologic races indicated no major shift in distribution. Race 56 predominated for the sixth consecutive year and comprised 56 percent of 1,536 isolates; 15B, 37 percent; 38, 5 percent; the 11-32 group, 5 percent; 17, 4 percent; and 14 other races the remaining 3 percent. Race 15B was prevalent in the spring-wheat area, with 49 percent of 503 isolates, most of which were 15B-2. A variant of race 17 to which Lee seedlings are susceptible, designated as 17A, was identified for the first time. The new bread wheats Crim and Justin and the durums Wells and Lakota were highly resistant to all United States isolates to which they were tested, but Selkirk seedlings were susceptible to about 1 percent of the isolates.

Fifteen races and subraces were identified in 40 aecial isolates from barberry. Isolates of 7 of the races attacked seedlings of one or more of 5 regular supplemental wheat differentials, plus Langdon durum, and two new Minnesota wheats now in the advanced testing stage. Seedlings of Crim were moderately susceptible to a new race found on barberry in Washington.

*This report includes information concerning stem-rust development in some states outside the Central Plant Pest Control Region.

Race 6F accounted for 70 percent of 381 isolates of oat stem rust identified. Race 6AF, which attacks all known commercial varieties in the United States, comprised 10 percent; the 7 group (7, 7A, 7AF), 8 percent; and 13 other races and subraces the remaining 12 percent. About 93 percent of the isolates had virulence for either the host genes BC or F or both. Races 6F and 6AF were also identified from barberry in Virginia.

Fifty-three species and varieties of *Berberis* and *Mahonia* were tested for susceptibility to stem rust (*Puccinia graminis*). Tests were made principally with the wheat, rye, and redtop varieties of rust. As a result of tests completed in 1963 and early 1964, the following five barberries and Mahonias were added to the resistant list: *Berberis media* "Park Juweel" (*B. Chenaultii* x *B. thunbergi*) from Paramentier Roses; *B. media* "Park Juweel" (*B. candidula* x *B. thunbergi*) from Glenn-dale, Maryland; *B. triculosa* from Westbury Rose Company, Westbury, Long Island, New York; *Mahonia amplexans*, a native Mahonia from California; and *M. aquifolium atropurpurea*, a red-leaved variety from Holland.

The other species and varieties, including six new entries, require further testing for final determination of resistance or susceptibility.

Barberry Susceptibility Tests

Fifty-three species and varieties of *Berberis* and *Mahonia* were tested during the fall of 1963 and spring of 1964 for susceptibility to stem rust (*P. graminis*). Tests were made with inoculum consisting principally of wheat, rye, and redtop varieties of rust. Fourteen varieties that had been resistant in previous tests were retested to additional rust inoculum and remained resistant.

The following barberries and Mahonias were added to the resistant list in fiscal year 1964:

Berberis triculosa (from Westbury Rose Company, Westbury, Long Island, New York)

Berberis media "Park Juweel" (*B. Chenaultii* x *B. thunbergi*)
from Paramentier Roses

Berberis media "Park Juweel" (*B. candidula* x *B. thunbergi*)
from Glenn-dale, Maryland

Mahonia aquifolium atropurpurea (Red-leaved variety from Holland)

Mahonia amplexans (Native Mahonia from California)

During the period of this report, the following species and varieties were received at the Cooperative Rust Laboratory for testing:

Berberis thunbergi atropurpurea superba (from Vander Pol in Holland)

Berberis thunbergi atropurpurea superba (from Congdon's Wholesale Nursery)

Berberis thunbergi "Kolbold" (from Monrovia Nursery Company)

Berberis pruinosa-longifolia (from U. S. Plant Introduction Station, Glenndale, Maryland)

Berberis veitchii (from U. S. Plant Introduction Station, Glenndale, Maryland)

Mahonia repens var. rotundifolia (from U. S. Plant Introduction Station, Glenndale, Maryland)

In tests during the spring of 1964, the two sources of B. thunbergi atropurpurea superba were susceptible to most cultures of rust to which they were tested. Two of the above Berberis species--B. thunbergi "Kolbold" and B. pruinosa-longifolia--and Mahonia repens var. rotundifolia were not adequately tested because of poor infection of check plants and heat injury to foliage of test plants due to excessively high temperatures during the period of tests in the laboratory. The plants of B. veitchii have not yet been tested.

CEREAL LEAF BEETLE



Adult and larva of cereal leaf beetle on leaf of a grain plant.

The cereal leaf beetle (Oulema melanopa) had spread to 83 counties in Michigan, Indiana, and Ohio by the end of fiscal year 1964. The count one year ago was 41. Collections of larvae or adult beetles were made in counties to the east and north of those found infested last year in Michigan and Ohio and to the south in Indiana. The spread since it was first found in this country in 1962 is reflected in the following table:

State	: No. Counties Infested - F.Y.		
	: 1962	: 1963	: 1964*
Indiana	2	25	32
Michigan	2	15	34
Ohio	0	1	17

*The 1964 figures represent the counties from which beetle specimens have been confirmed to date by U. S. National Museum.

Oats again this year were the favorite host plant of this insect. Young plants were damaged severely in areas of heavy populations as were those of wheat and barley in some instances. As the cereal crops matured, the summer adults also fed on various wild grasses, and quite heavily on the lower leaves of young corn plants.



PPC employee sweeping a field of oats during survey for the cereal leaf beetle.

Survey in 1964 was started in the three-state area late in April since beetles appeared in fields much later this season than last. In July 1963, a Methods Improvement Operations plane made an aerial survey of flying beetles over an area of heavy populations in southwestern Michigan and Indiana. Beetles were trapped at the 500-800-foot level and one was caught at 1,000 feet. Field surveys for this beetle were made in other states in the Region, with negative results.

In July 1963, aerial application of Sevin was made to approximately 12,000 acres of cropland in southwestern Michigan and north-central Indiana. One pound of actual Sevin, with sticker, in water, at the rate of one gallon solution per acre, was applied with good results. Late in April and early in May, 1964, excellent control of the overwintering adult beetles was accomplished in certain areas of Indiana, Michigan, and Ohio with the aerial application of technical malathion at the rate of 5.3 to 8 ounces actual per acre. All suppressive programs were monitored by State agencies cooperating with the Plant Pest Control Division under formal agreement.



Section of wheat stubble split open to show position of overwintering cereal leaf beetle inside the straw. Normal position of beetle is head down in standing stubble.

Infested areas comprising whole counties, and portions of those on the perimeter, were placed under quarantine in the three states. Fumigation of box-cars, baled hay, straw, and related activities were carried on throughout the year by Plant Pest Control and State personnel.

The accomplishments of the Methods Improvement Laboratory at Niles, Michigan, have been an important part of the cereal leaf beetle program. The work included checks and studies on many phases of fumigation and related problems.

CLB Control Accomplishments - Fiscal Year 1964

State	: Prop-	: Prop-	:	:	:	: Regulatory	
	: erties	: erties	:	: Prop-	: *Acres	: Inspection	
	: Sur-	: In-	: Acres	: erties	: Treated:	: Prop-	:
	: veyed	: fested	: Infested	: Treated:	(Air)	: erties	: Other
Ill.	1,906	0	0	0	0	0	0
Ind.	4,998	237	1,359,254	280	20,834	727	740
Iowa	227	0	0	0	0	0	0
Ky.	48	0	0	0	0	0	0
Mich.	14,148	4,391	1,051,153	1,245	143,241	1,065	10,279
Mo.	136	0	0	0	0	0	0
N. Dak.	136	0	0	0	0	0	0
Ohio	5,185	88	51,960	444	10,720	161	1,353
S. Dak.	178	0	0	0	0	0	0
Wis.	394	0	0	0	0	0	0
Totals	27,356	4,716	2,462,367	1,969	174,795	1,953	12,372

*No ground treatments.



Part of the routine of the survey for cereal leaf beetle is examination of the contents of the net for presence of this pest.

ECONOMIC INSECT SURVEY

Eleven of the 13 states in the Central Region now employ survey entomologists under the terms of the Cooperative Economic Insect Survey agreement. The most recent is Indiana, where the survey entomologist reported for duty in the spring of 1964. Other states cooperating in this program are Illinois, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

Survey entomologists make weekly surveys to observe and note insect conditions. Their reports are submitted to the survey coordinator in each state, who also receives insect notes from various State and Federal personnel and individual cooperators. These are summarized and released to interested agencies, individuals, commercial firms, pesticide dealers, radio and TV stations, etc., and to the Plant Pest Control Division for inclusion in the weekly Cooperative Economic Insect Report.

Plant Pest Control personnel assisted cooperators with the fall chinch bug survey in Illinois, Nebraska, and Kansas. No formal surveys were made in other states in the chinch bug area (Indiana, Iowa, and Missouri) but data was submitted by cooperators as observations were made throughout the season.

A survey for potato psyllids was made in western Nebraska. Kansas cooperators decided that a survey for beet leafhoppers was not needed in 1964.

State personnel in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin conducted the annual fall survey for European corn borer. Survey data was submitted to the Survey and Detection Operations office of the Plant Pest Control Division for summarization and publication in the CEIR.

The Insect Survey and Detection exhibit was displayed at the Minnesota State Fair, at the Entomological Society of America meeting in St. Louis, in the Entomology Building at the University of Missouri in Columbia, and at the Kansas City, Missouri, Flower and Garden Show.

Each Supervisor in Charge has been furnished with a set of portable peg-board display panels for arranging and showing their own insect-detection and other program displays. Much use has been made of these at county and State fairs, and community meetings.

Cooperative Economic Insect Survey - Central Region

State	Survey Entomologist	Reporting Period	Survey Coordinator	Location
Illinois	Clarence White	1/1 - 12/31	Dr. H. B. Petty	Urbana, Illinois
Indiana	Ralph Bram	3/1 - 12/31	Dr. J. V. Osmun	W. Lafayette, Indiana
Iowa	None	--	Dr. Wilfred Craig	Ames, Iowa
Kansas	Leroy Peters	1/1 - 12/31	Dr. Herbert Knutson	Manhattan, Kansas
Kentucky	None	--	Dr. L. H. Townsend	Lexington, Kentucky
Michigan	Alfred Dowdy	3/1 - 12/31	Dr. Gordon Guyer	E. Lansing, Michigan
Minnesota	Robert Flaskerd	4/1 - 12/31	Dr. Donald Coe	St. Paul, Minnesota
Missouri	Edwin C. Houser	1/1 - 12/31	George W. Thomas	Columbia, Missouri
Nebraska	Paul Bergman	4/1 - 12/31	Dr. R. E. Hill	Lincoln, Nebraska
North Dakota	Richard Frye	4/1 - 10/31	Dr. J. R. Dogger	Fargo, North Dakota
Ohio	William Lyon	4/1 - 12/31	Dr. Roy W. Rings	Wooster, Ohio
South Dakota	Sherwin Hintz	3/1 - 11/30	Dr. R. J. Walstrom	Brookings, South Dakota
Wisconsin	Marlin Conrad	3/1 - 12/31	Philip W. Smith	Madison, Wisconsin

EUROPEAN CHAFER

The European chafer is not known to occur in the Central Region. Black light and chemical traps were operated in Ohio this past season. In addition, some visual survey was done in Ohio, all with negative results.

This pest has been found approximately 35 miles from the extreme northeast corner of Ohio. All available black light traps in the Central Region were transferred to Ohio for use in Ashtabula County and, in addition, 20 chemical traps were ordered from the Eastern Region. State cooperators were cognizant of the problem and also made close checks of any suspected specimens.

GOLDEN NEMATODE

Intermittent surveys for this pest were made in the important potato-growing areas of the Central-region States from 1949 to 1962. All were negative.

In 1963 this survey was combined with that for the soybean cyst nematode, because of the similarity in securing soil samples. This past season eight properties in two Kentucky counties were sampled, with negative results.

GRASSHOPPER

Grasshoppers were not a serious problem in the Central Region during fiscal year 1964. Timely rains, resulting in improved range and crop conditions, were a contributing factor in reducing damage except in a few localities. Under a cooperative program, the U. S. Fish and Wildlife Service and the Division sprayed 300 acres in the Snake Creek Wildlife Refuge in North Dakota. The Wildlife Service supplied the Sevin. Roadside spraying was approved in twelve North Dakota counties: Bottineau, Burleigh, Emmons, Golden Valley, Hettinger, Kidder, McHenry, McLean, Pierre, Sheridan, Ward, and Wells. Seven of these counties were approved in July 1963 and six in June 1964. (McHenry County participated both seasons.) Individual cooperative Federal agreements were signed with each county. By June 29, 1964, plans were completed for the spraying of approximately 34,000 acres of rangeland for grasshopper control on the Pine Ridge Indian Reservation in Shannon County, South Dakota. Technical malathion will be applied by aircraft at the rate of 8 ounces per acre. An estimated 12,000-acre cooperative Federal-State-Rancher control operation in Sioux County, Nebraska, will get under way following completion of the program in South Dakota. In cropland areas, farmers did their own control work with the technical information supplied by the Plant Pest Control Division and State cooperators.

Formal adult grasshopper surveys were made by Plant Pest Control and State personnel in infested areas of Illinois, Indiana, Kansas, Michigan, Minnesota, Nebraska, North Dakota, South Dakota, and Wisconsin. In Iowa, Missouri, and Ohio the survey information was the result of observations during the season by Plant Pest Control personnel and State cooperators.



"Pawnee 150" plane equipped for use in spraying for grasshopper control in rangeland areas. Note booms underneath plane.

GYPSY MOTH

Michigan remains the only State in the Central Region in which the gypsy moth has been found; however, no moths have been trapped nor egg clusters found since late summer 1961. In May 1962, an area of 4,320 acres was treated. Last season 3,056 traps were placed in a 590-square-mile area comprising parts of Clinton, Eaton, Ingham, Ionia, and Shiawassee Counties in the central part of the State.

Traps were also placed in State parks, waysides, public camp grounds, and similar locations in Iowa, Minnesota, Missouri, Ohio, and Wisconsin. Results were negative.

Trapping operations by states included:

<u>State</u>	<u>No. Traps</u>
Iowa	45
Michigan	3,056
Minnesota	12
Missouri	25
Ohio	508
Wisconsin	<u>275</u>
Total	3,921

Several Christmas-tree outlets in Iowa, Kentucky, and Ohio were checked by Plant Pest Control inspectors to observe compliance with the gypsy moth regulations. No violations were found. Plant Pest Control inspectors in Michigan, Ohio, Minnesota, and Nebraska checked camping equipment of campers who in 1963 had stopped at gypsy-moth-infested camp areas in New England. No evidence of egg clusters was found.

JAPANESE BEETLE

Japanese beetles continued to be a problem in all Central Region states east of the Mississippi, except Wisconsin. Trapping to detect the presence of beetles proved negative in Iowa, Kansas, Nebraska, North Dakota, South Dakota, and Wisconsin. One beetle, suspected of being a hitchhiker, was trapped near the U. S. Airforce Base parking ramp at the Minneapolis-St. Paul (Minnesota) International Airport. Light, scattered infestations were found in portions of St. Louis, Missouri. Beetle populations increased in the states to the east.

Granular insecticide was applied with ground equipment to several areas in Illinois, Michigan, and Ohio. The greatest problem area was in the city of Battle Creek, Michigan, where a percent of the resident owners opposed the program. In Ohio, the Cleveland-Hopkins and Burke Lakefront Airports, both near Cleveland, were treated with Dieldrin in granular form. Some mist-blowing of foliage was also done in a few localities, principally along main highways.

Programs were monitored in Illinois and Michigan to determine the impact of the control work on fish, birds, and wildlife. Agencies other than the Plant Pest Control Division cooperated in the studies.

On July 18, 1963, the Akron-Canton and Youngstown, Ohio, airports were declared hazardous because of heavy beetle populations. All planes originating or stopping at these points and departing for unregulated destinations were treated. Some perimeter mist-blowing was done at the Cleveland-Hopkins Airport to reduce the number of beetles. Random inspections were made of planes at O'Hare Field in Chicago and Lambert Field in St. Louis. Additional regulatory activities involved inspection of sweet corn, treatment of soil samples, nursery inspection, and other related commodities.

Approximately 90,000 Japanese beetle grubs were collected by Plant Pest Control personnel in Ohio. These were delivered to the Northern Utilization and Research Development Laboratory, Peoria, Illinois, for use in research studies on milky disease.

Twelve colonies of the Japanese beetle parasitic wasp, Tiphia vernalis, were received from the Eastern Region and released at selected sites in Illinois, Indiana, and Ohio. These sites will be observed to see if the wasp becomes established.

Japanese Beetle Control Accomplishments - F. Y. 1964

State	: Acres	: No. Traps : : Installed : : F.Y. :	: Acres : : Infested :	: Acres : : Treated : : (Ground)
Illinois	0	6,598	8,349	5,205
Indiana	0	16	0	0
Iowa	50	1,811	0	0
Kansas	0	396	0	0
Kentucky	1,541	5,360	50	1,856
Michigan	0	21,726	78,034	22,851
Minnesota	60	784	0	0
Missouri	0	3,183	160	0
Nebraska	0	29	0	0
North Dakota	0	4	0	0
Ohio	6,992	4,735	171	1,109
South Dakota	0	134	0	0
Wisconsin	0	1,493	0	0
Totals	8,643	46,269	86,764	31,021

KHAPRA BEETLE

During the year an unusual number of shipments from khapra-beetle-infested ships required inspection or treatment. Eight different infested cargo-carrying vessels were involved in commodity shipments to various destinations in the Central Region. Costs of fumigation of commodities and carriers in all cases were assumed by the carrier or the establishment that had custody of the commodity.

Investigation of shipments from infested ships was accomplished by Plant Pest Control personnel. On occasions we have been assisted by Plant Quarantine inspectors or State regulatory officials. State inspectors in Wisconsin and Indiana supervised fumigation of cargo received from infested ships when Plant Pest Control personnel were not immediately available to assist.

During the year, 1,406 establishments were inspected as a result of leads concerning suspect commodities received from beetle-infested sources.

PEACH MOSAIC

No evidence of peach mosaic has been found in orchards surveyed in the Central Region. Inspections of 407,500 trees in the Stark Brothers Nursery at Louisiana, Missouri, were all negative.

PHONY PEACH

Inspections for phony peach disease were made in Bullitt County, Kentucky, and in Dunklin, Cape Girardeau, and Scott Counties, Missouri. Of the 57,368 trees examined, eight (all in Missouri) were found to be infected. These were removed by the owners.

Periodically since 1931, phony-peach surveys have been made in parts of Illinois, Indiana, Kentucky, and Missouri. Jackson, Massac, Pulaski, and Union Counties, Illinois, and Dunklin County, Missouri, were under regulation by the respective states.

Accomplishments - Fiscal Year 1964

State	: Properties: : Surveyed	: No. Hosts: : Examined	: Properties: : Infested	: Hosts : Infested	: Trees : Removed
Kentucky	6	7,500	-	-	-
Missouri	<u>41</u>	<u>49,868</u>	<u>4</u>	<u>8</u>	<u>8</u>
Totals	47	57,368	4	8	8

PINK BOLLWORM

Observations and inspections for the presence of the pink bollworm were made in the cotton-growing areas of southeastern Missouri and western Kentucky. To date all inspections made have been negative.

The Missouri State Department of Agriculture and the Plant Pest Control Division, Agricultural Research Service, U. S. Department of Agriculture, cooperate in making checks and surveys for this pest in Missouri. Gin trash, amounting to 3,176 bushels, from 34 gins in the southeastern counties, was examined, with negative results. Cotton gins in Fulton and Hickman Counties, Kentucky, were inspected several times during the ginning season, also with negative results.

Four carloads of uncertified cotton products were fumigated at Mound City, Illinois, under the direction of Plant Pest Control personnel. The contents of the cars were placed in storage in that area.

Supervisors in the Central Region spot-checked numerous shipments of cotton products consigned to various points throughout all states. These products ranged from those used in mattress manufacturing to oil-well drilling. Supervisors ascertained that proper disposition was made of the various items and that they were not diverted from the Region to southern destinations.

SOYBEAN CYST NEMATODE

The soybean cyst nematode has been found in two counties in southern Illinois, four counties in western Kentucky, and seven counties in southeastern Missouri. Intensive surveys were continued in these areas. Soil sampling--all negative--was also done at random stops in states outside of the infested area. Symptom survey was made from the air in six southern Illinois counties. Using a Division plane, nine suspect fields were located in Alexander County and five in Pulaski County. Soil samples from these fields at a later date showed that four of the suspects were infested in the former county and two in the latter. In Missouri, symptom survey by car revealed numerous suspected fields, many of which were later found infested.

In a number of cases in the three-state area, heavily damaged fields were replanted. The following is an estimate of the reported damage caused to the soybean crop by the soybean cyst nematode:

State	Number of				Value in Dollars
	Counties:	Fields	Acres	Bushels	
Illinois	2	26	2,627	9,195	\$ 24,365
Kentucky	1	60	3,000	75,000	185,000
Missouri	7	434	-	39,161	100,247
Totals	10	520	5,627	123,356	\$309,612

Regulated areas cover all or parts of infested counties in the three-state area. These counties are: Illinois - Alexander and Pulaski; Kentucky - Ballard, Fulton, Graves, Hickman; Missouri - Butler, Dunklin, Mississippi, New Madrid, Pemiscot, Scott, and Stoddard.

Regulatory activities continued to increase. Farm machinery was washed and/or certified so it could be moved out of regulated areas; many cotton, hay, and bean combines, corn pickers, and other similar machines were fumigated. The Missouri Highway Department continued their cooperation by maintaining and moving, when necessary, quarantine signs placed along main highways at the edge of regulated areas.

Forty-eight railroad carloads of sugar beets were harvested within the regulated area in the southeast counties of the "Bootheel" area of Missouri and shipped to Colorado for processing.

SCN Accomplishments - Fiscal Year 1964

State	Prop- : erties:	Acres Surveyed	Prop- : erties:	Acres Infested	Commodity Treatment	
	:Surveyed:		:Infested:		Fumigated:	Other
Illinois	1,166	50,396	56	6,093	19	203
Iowa	899	24,363	-	-	-	-
Kentucky	560	27,069	21	881	17	399
Minnesota	304	7,796	-	-	-	-
Missouri	1,891	84,644	387	21,268	176	1,135
N. Dakota	22	660	-	-	-	-
S. Dakota	60	1,800	-	-	-	-
Totals	4,902	196,728	464	28,242	212	1,737

Soybean Cyst Nematode Infestations - Cumulative Through June 30, 1964

State	County	Prop- erties Infested	Acres Infested	Commodities Treated	
				Fumigated	Other
Illinois				20	295
	Alexander	42	4,958		
	Pulaski	22	1,400		
Kentucky				133	1,044
	Ballard	4	191		
	Fulton	47	3,910		
	Graves	6	108		
	Hickman	18	851		
Missouri				526	2,286
	Butler	4	234		
	Dunklin	159	5,599		
	Mississippi	63	3,924		
	New Madrid	279	11,277		
	Pemiscot	469	18,450		
	Scott	13	702		
	Stoddard	117	8,150		
Totals		1,243	59,754	679	3,625

WHITE-FRINGED BEETLE

The white-fringed beetle was first detected in this Region in a single location in Fulton County, Kentucky, in September 1960, and again in a small area in Galloway County in the same State late in July 1962. Granular dieldrin was applied in both instances under co-operative Federal-State action.

Surveys for this insect were made in one county in Illinois, two in Indiana, thirteen in Missouri, and nineteen in Kentucky. All survey was negative.

WITCHWEED

This parasitic plant pest is not known to occur in the Central Region. Plant Pest Control inspectors, while on other program activities, have, as time permitted, made visual surveys for witchweed. Survey, all negative, was accomplished in 23 counties in Iowa, 16 in Minnesota, 17 in Missouri, and 23 in Ohio.

Witchweed Survey - Fiscal Year 1964

State	: Counties : Surveyed	: Properties : Surveyed	: Acres : Surveyed
Iowa	23	243	1,562
Minnesota	16	32	1,125
Missouri	17	198	5,635
Ohio	<u>26</u>	<u>147</u>	<u>5,500</u>
Totals	82	620	13,822

ASSOCIATED ACTIVITIES

Informational activities are extremely important to successful program operations. Emphasis was placed by field supervisors on keeping the general public, agricultural groups, and industry fully informed concerning the progress, accomplishments, and status of all active plant pest control programs.

Through the media of newspaper, radio, TV, and feature articles, the public was kept currently informed of program operations. Exhibits and demonstrations were placed at various gatherings such as agricultural meetings, State and county fairs, grain and flower shows, and industrial shows. Displays were set up in banks, county buildings, and schools as another means of keeping the public informed.

Particular emphasis during the year was placed on the cereal leaf beetle program. This activity was given excellent coverage by press, TV, and radio in the States of Michigan, Indiana, and Ohio. A great deal of interest in this pest was evident in all the small-grain-growing areas in the Region, indicated by requests for informational materials received from the State Extension Services and regulatory officials. The Crop Quality Council provided invaluable service by keeping various facets of industry up-to-date on the cereal leaf beetle situation and pointing out the potential effect it would have should the pest become established in the country's important grain-producing areas.

Versa panels were placed in each area, and, because of their simplicity and convenience in handling, proved to be a popular tool for exhibits and demonstrations. Riker mounts, specimen material, and illustrations were used to supplement informational materials with the panel exhibits.

Summary of Associated Activities, by Programs, in Central Region - Fiscal Year 1964

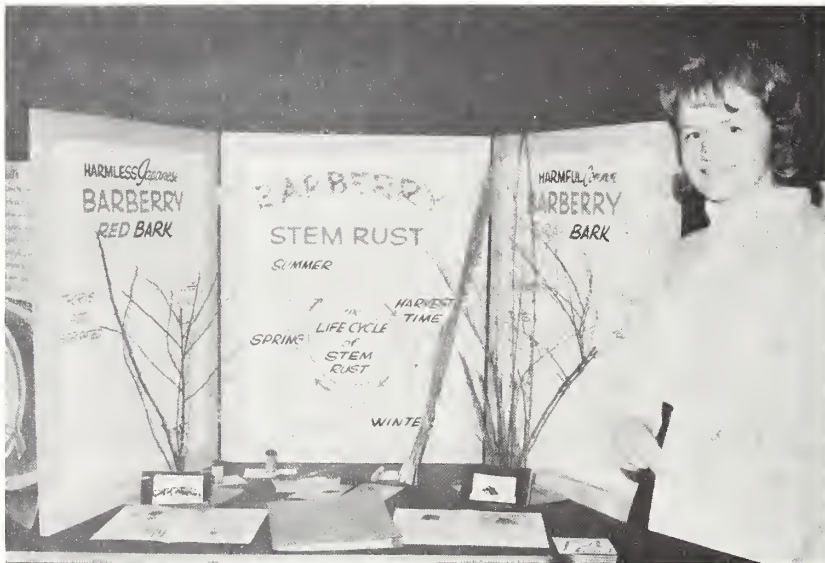
Program	Public : P r e s e n t a t i o n s													Feature :		Extent These Aids Were Used				Special : Man Hrs.	
	: Meetings :													: & News :		: Ex- : Bul- : Circu- : Infes. Maps :				: Reports : Tech.	
	: Attended :													: Stories :		: lars : & Posters :				: Asst.	
	Talks	Slides	Films	Radio	TV																
BE	4	5	8	22	4	-	16	7	1,414	8,193	193	101	53								
BN	-	-	-	-	-	-	-	-	7	10	-	-	-								
CLB	15	23	13	1	1	2	1	41	24,924	4,386	1,323	-	18								
EC	-	-	1	-	-	-	-	-	13	5	-	-	-								
GN	-	-	1	-	-	-	-	-	2	-	-	-	-								
GC	11	13	5	11	3	1	5	2	1,573	2,605	425	-	56								
GM	-	1	1	12	-	-	-	1	1,303	130	1	-	-								
ID	4	1	4	6	-	-	-	2	2,510	928	1,294	217	5								
IFA	-	-	3	-	-	-	-	-	43	84	-	1	-								
JB	13	53	9	16	13	3	66	7	4,492	52,106	1,231	3	469								
KB	1	1	5	1	-	-	-	1	354	65	-	-	-								
MF	-	-	1	-	-	-	-	-	-	-	-	-	-								
PP	-	-	-	-	-	-	-	-	4	20	-	-	-								
PBW	-	-	-	-	-	-	-	-	-	210	-	-	-								
SCN	14	12	29	-	1	-	28	2	1,556	2,468	160	199	-								
WFB	1	-	1	-	-	-	-	1	345	558	-	5	-								
WW	<u>1</u>	<u>2</u>	<u>9</u>	<u>8</u>	<u>-</u>	<u>1</u>	<u>-</u>	<u>1</u>	<u>503</u>	<u>1,388</u>	<u>20</u>	<u>1</u>	<u>-</u>								
Totals	64	111	90	77	22	7	116	65	39,043	73,156	4,647	527	601								

Summary of Associated Activities, by States, in Central Region - Fiscal Year 1964

State	P r e s e n t a t i o n s										Feature		Extent These Aids Were Used				Special	
	Public		Meetings		Attended		Talks		Slides		Films		Radio		TV		Ex- : Bul- : Circu- : Infes. : Maps : Reports : Tech. : Asst.	
	: Public		: Meetings		: Attended		: Talks		: Slides		: Films		: Radio		: TV		: Ex- : Bul- : Circu- : Infes. : Maps : Reports : Tech. : Asst.	
	: Public		: Meetings		: Attended		: Talks		: Slides		: Films		: Radio		: TV		: Ex- : Bul- : Circu- : Infes. : Maps : Reports : Tech. : Asst.	
Illinois	7	12	19	5	-	-	-	-	-	-	2	1,688	383	318	-	-	-	-
Indiana	19	5	-	9	-	-	-	-	-	-	8	4,756	1,019	486	-	-	-	-
Iowa	3	3	3	-	-	-	1	2	-	185	-	4,992	400	1	-	-	-	-
Kansas	-	-	47	7	2	-	4	1	4,979	3,966	606	192	5	-	-	-	-	-
Kentucky	2	8	2	-	2	1	4	1	1,590	3,410	403	103	6	-	-	-	-	-
Michigan	-	-	-	12	6	-	2	1	13,400	43,560	100	-	-	-	-	-	-	-
Minnesota	4	9	5	7	-	-	-	-	-	3	4,882	381	755	28	14	-	-	-
Missouri	7	6	4	-	1	-	28	-	54	3,536	-	97	-	-	-	-	-	-
Nebraska	8	10	5	12	3	2	6	-	3,221	580	557	-	-	-	-	-	-	-
Ohio	11	52	2	25	8	3	70	44	3,909	5,758	499	6	478	-	-	-	-	-
S. Dakota	2	1	1	-	-	-	-	2	250	3,075	-	98	-	-	-	-	-	-
Wisconsin	1	5	2	-	-	-	-	3	129	2,496	523	100	-	-	-	-	-	-
Totals	64	111	90	77	22	7	116	65	39,043	73,156	4,647	527	601	-	-	-	-	-



At left, the CLB portion of a combined CLB-JB exhibit used October 2, 1963, at Wisconsin Farm Field Day, Arlington, Wis.



Winner of the Science Merit Award at the High School Science Fair at Racine, Wisconsin, during school term 1963-64 was this barberry and stem-rust exhibit. All planning, lettering, and setting up of the display was done by the young lady, who is granddaughter of a Wisconsin PPC Technician.

(*--*)

P L A N T P E S T C O N T R O L D I V I S I O N

COOPERATIVE PROGRAMS

EASTERN REGION

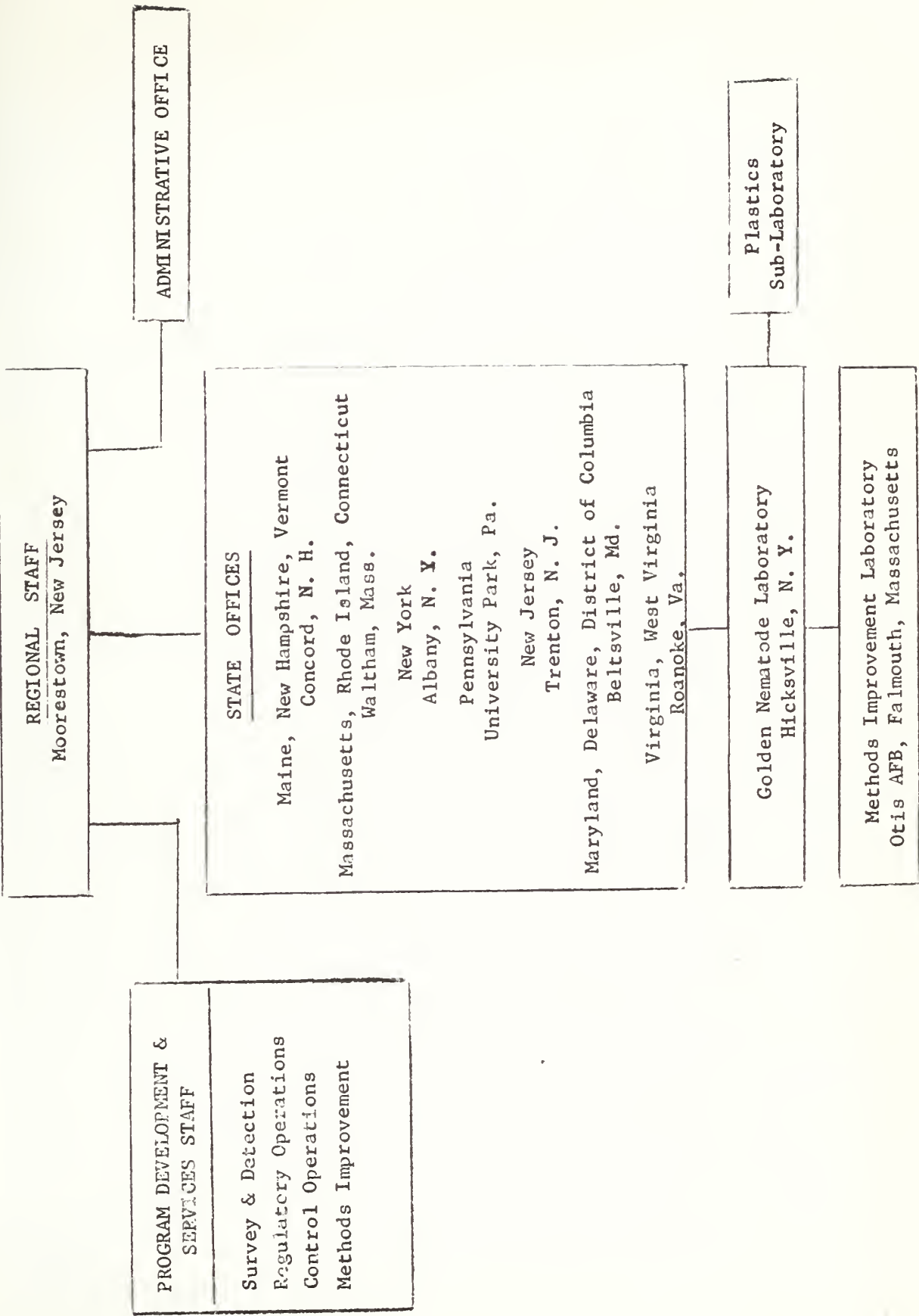
FISCAL YEAR
1964

December 1964
Moorestown, New Jersey

U. S. Department of Agriculture
Agricultural Research Service
Plant Pest Control Division

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SUMMARY OF ASSOCIATED ACTIVITIES

Fiscal Year 1964

Program	PRESENTATIONS:				Feature & EXHIBITS:			Ext. Aids Used			Infest.:			Man Hrs.	
	Public Msgs. Att'd	Talks	Slides	Films	Radio	TV	News Stories	bits	Bul.	Circ.	Posters	Spec. Reports	Tech. Asst.		
BE	6	35	28	81	3	24	5	13	526	1422	165	61	50		
BW								1					6		
BTM									25	85					
CLB	3	3	2				1	2	299	216		60	9		
EC	5	28	46	10		24	3	10	4739	3658	157		50		
GN	1			7				2	32	1240					
GW	15	38	54	125	4	25	19	14	6149	8401	2996	31	167		
IFA		6	6					2	365	253			6		
ID	30	20	114	31	1			15	2430	6184	758		51		
JB	15	37	38	96	1	24	3	28	14262	16593	1240		437		
KB		13	14	2				1	111	109			46		
MED. FF.								1					6		
MEX. FF.								1					6		
PB											4				
SCN	1	6	7					3	523	1627			43		
WFB	1	7	7				1	4	598	2640			135		
WW	1	23	22	7		29		7	1225	2548	4		12		
TOTAL	78	216	338	359	9	126	32	104	31284	45186	5324	152	1026		

Fiscal Year 1964

The barberry eradication program was continued cooperatively with State agencies in Pennsylvania, Virginia, and West Virginia. Under this year's plan of work, emphasis was given to rework requirements. However, initial work was scheduled and conducted in several counties. In the three eradication states, nearly seven million rust spreading barberry bushes were destroyed on 977 old properties and 193 new properties surveyed. Surveys on 1,471 old properties were negative. A total of 155 properties was relegated to the inactive status and 1,567 square miles were placed on maintenance.

Overall stem rust losses in Virginia and West Virginia were reported as "trace" amounts. In a few cases, heavy rust damage was observed in sections of small grain fields in close proximity to barberries in some of the eradication counties. Stem rust losses in Pennsylvania were also estimated as trace amounts; and, leaf rust as 2% on wheat and trace amounts on the small grains.

A field review was conducted in the fall in Virginia and West Virginia to determine current wheat acreage in counties scheduled for barberry eradication. The data for West Virginia shows that wheat acreage in eradication counties has remained about the same for the past 10 years, but there has been a shift of growing areas within the counties. In Virginia, the data shows considerable decrease in wheat acreage from 1935 to 1960. Much of the small grain acreage has been converted to pasture lands.

As a result of examination of barberry, mahoberberis, and mahonia in growing plots of nurseries, and arrangements made with dealers, 189 establishments were authorized to move such plants interstate. Included in this total are two seed growers. Regulatory activities also included inspection of barberry plants in postentry status, and applications from nurseries to receive one-year old seedlings.

Testing of selected herbicides was continued in plots under the direction of Methods Improvement personnel.

Fiscal Year 1964

Federal-State scouting surveys were conducted in the states of Maine, New Hampshire, Vermont and Massachusetts. Emphasis was placed on the scouting of those areas having a record of previous infestations.

In New Hampshire, surveys disclosed scattered light infestations in the counties of Hillsboro, Merrimack and Rockingham. Negative findings were recorded in Maine with the exception of one winter web in the town of Wells, York County. No infestation was found in Vermont. In Massachusetts, an infestation comprising approximately 100 acres was found in Barnstable County adjacent to the previously known infestation at Provincetown-Truro. Other known infestations exist in the towns of Dennis and Barnstable, Barnstable County. Surveys in Essex, Suffolk, Norfolk, Worcester and Franklin Counties were negative.

Control activities were confined to the cutting and burning of winter webs. No insecticide treatments were applied for control purposes. In New Hampshire, 1,861 webs were cut at eight locations in the towns of Allentown, Frankestown, Hooksett, Loudon, Mount Vernon, Northwood and Weare. At a site of previous infestation in Wells, Maine, one web was found and destroyed.

Fiscal Year 1964

Continued emphasis was placed on cooperative economic insect survey activities during the year. Close working relations were maintained with survey coordinators in all states. Workshops were held in New Jersey and New York to encourage greater participation on the cooperative survey programs. In addition, a special short course "Recognition of Common Insects" was conducted by the Entomology Department of Rutgers University at the request and on behalf of the PPC Division and the New Jersey Division of Plant Industry. This one week course was attended by 21 Division inspectors from the Eastern Region, 2 Division employees from the Southern Region and 8 employees of the New Jersey Department of Agriculture.

In consideration of the presence of winter moth Operophtera brumata in Nova Scotia, a trapping survey for this pest, initiated in 1961, was continued in 1963. Traps were operated in cooperation with the State of Maine during the month of November. A total of 25 black light traps was utilized along the coastal areas of eastern Maine from Ellsworth east to Calais and Baileysville. To supplement the trapping operation, the procedure of banding trees with tanglefoot was implemented for the first time.

Observations and sweepings for the cereal leaf beetle were made at selected sites throughout the Region where host products were received from infested states. Establishments receiving hay and straw were given particular attention. A modified Berlese funnel was utilized in the processing of sweepings or debris collected. Results were negative.

In general detection survey operations black light traps were operated in varying degrees in seven Eastern Region states and the District of Columbia. Twenty traps were utilized at 55 locations which included principal commercial and military airfields, as well as major ports and harbors. Traps were operated one night a week from early June to late September. After screening of collected materials specimens were sent to cooperating State entomologists for further identification. Specimens which required special taxonomic attention were forwarded to the Insect Identification Section, Washington, D. C.

The fruit fly trapping program initiated in 1961 was expanded in all states in the summer of 1963. Sticky board traps, as well as the conventional McPhail and Steiner traps were utilized. In all, 208 traps were operated at 236 sites in the Region. Traps were placed at principal ports of entry, as well as at locations of possible introduction such as sugar refineries and import establishments. The sticky board trap proved to be effective in attracting native species. It is interesting to note that eight additional species were trapped over those reported in the previous year's program.

Fiscal Year 1964

Chemical and black light traps were again used extensively in survey undertakings. A total of 1,328 traps was operated at 6,312 sites. Visual inspections were conducted principally as a means of quickly delimiting areas of infestation initially detected by traps. Surveys were conducted in all states within the Region with the exception of Virginia. The need for better means of detecting light infestations of this pest still exists.

The 1963 summer surveys disclosed continued local spread of the chafer at several locations adjacent to known infestations in New York, New Jersey and Connecticut. In New York, new county finds were made in Genesee, Cortland, and Clinton; however, only a single specimen was recovered in each county. No chafers could be found in the Albany County infestation which was found and treated in 1962, nor have additional specimens been found in Madison County. The most significant extensions to previously known infested areas were in Niagara and Richmond Counties.

In Pennsylvania, in late June 1963 surveys resulted in the discovery of the first chafer infestation in the state - at Erie. Continued surveys conducted in July and August 1963 indicated that the infestation involved an area of approximately one square mile.

In New Jersey, the only finds were in Hudson County, adjacent to previously known infested areas which have received treatment. The most distant find was at Secaucus where a single chafer was trapped.

In Connecticut, two catches of a single beetle each were made in Hartford County, representing a new county record.

A total of 2,745 acres was surface soil treated with residual insecticides in Pennsylvania, New Jersey and New York. Within the city of Erie, Pennsylvania, 1,569 acres were treated. A helicopter was employed to treat 403 acres of non-residential areas, and the balance of the acreage was treated with ground equipment. All infestations found in the summer of 1963 in New Jersey were also treated in the fall. Treatment blocks included sections of Jersey City, Hoboken and Secaucus, totalling 1,152 acres. Three single chafer finds were treated in upstate New York, in or near the cities of Plattsburg, Cortland and Batavia.

Cooperative residual soil treatments were applied to 80 acres at Hancock Airport, Syracuse, New York in an effort to reduce hazard of spread.

Effective May 7, 1964, administrative instructions designating areas regulated under Federal Quarantine No. 77 were revised. This revision added three towns in Connecticut and four towns in New York to the Federally regulated area.

Funds available for the conduct of this program continued to be inadequate.

Fiscal Year 1964

Approximately 37,247 soil samples, representing some 42,368 acres were collected from 1,582 properties (field and grader stations) in the states of New York, Maine and New Jersey. Samples collected on Long Island totalled 33,759.

Surveys conducted outside Long Island, New York, continued to be negative. Intensive surveys on Long Island in the fall of 1963 revealed infestation on seven fields in Suffolk County, aggregating 340 acres.

Since the beginning of the program in 1941, a total of 16,567 acres has been recorded as infested on Long Island. Of this total, some 11,000 acres have been taken over for real estate development and 3,314 acres have been treated. Approximately 2,429 acres of agricultural land remain in the infested category.

The application of soil fumigant was started June 10 and completed on September 3, 1963. All potato fields known to be infested, 15 fields aggregating 489.20 net acres, were treated with DD at the rate of 90 gallons per acre, applied in two equal treatments of 45 gallons each, spaced approximately 10 days apart. Included were parts of two fields (10.14 acres and 35.13 acres) previously treated from which viable cysts were recovered.

The Division continued to cooperate with the New York State Department of Agriculture and Markets in the enforcement of State quarantine regulations. These activities involved 2,104 certification visits.

Fiscal Year 1964

Survey was conducted in all states within the Region except those known to be generally infested. In Pennsylvania, New York and New Jersey and the non-regulated sections of northern New England, a total of 62,885 traps was operated for detection or delimiting purposes. Approximately 1,520 additional traps were placed at selected locations in Delaware, Maryland, Virginia and West Virginia. The paper (Johnson) trap baited with synthetic gyplure was used exclusively. Limited visual scouting for egg clusters was conducted at selected positive trap sites.

Trapping and scouting surveys revealed infestations within the suppressive area and at several locations in non-regulated sections of New York, New Jersey and Pennsylvania. In New York, survey revealed serious build-up in the southern counties as was evidenced by the 555 positive trap sites in Orange, Rockland, Westchester and Nassau. Scattered trap recoveries were again made outside the regulated area in Hamilton and Franklin Counties, as well as in a sector of Jefferson County, which lies considerably to the west of the regulated area. In New Jersey, 154 traps recovered moths in six northern counties. Of particular note was the concentration in northern Somerset County. In Pennsylvania, survey revealed 12 positive trap sites in Pike, Monroe and Northampton Counties. In the non-regulated area of Maine, moths were taken in four traps in Washington County and in northern Vermont 10 traps attracted moths in Franklin, Lamoille and Orleans Counties.

In the Federal-State cooperative control program 79,395 acres involving 35 separate blocks were sprayed with a water-base formulation of Sevin at the rate of one pound per gallon, per acre. All sprays were applied by aircraft under Federal contract. All known infestations in Pennsylvania, six blocks totaling 18,360 acres in Pike, Monroe and Northampton Counties, were treated. In New Jersey, only peripheral areas of infestation in Sussex, Warren, and Somerset Counties, involving eight blocks, 41,840 acres, were sprayed. In the suppressive area in New York, twelve blocks, 10,240 acres, were treated in adjoining parts of Orange and Sullivan Counties. One positive trap site, 300 acres, in Otsego County was sprayed by the New York Conservation Department. In the non-regulated area in northern New York, the treatment program involved five blocks, 4,110 acres in Franklin County, and three blocks, 4,545 acres, in Jefferson County.

Within the generally infested area, State and local agencies in five states treated 81,312 acres to suppress heavy moth populations and prevent defoliation. DDT oil solutions were used on 66,974 acres, and Sevin on 20,348 acres. An additional 170 acres (test plot) were treated with Bacillus thuringiensis. Treatments were applied by aircraft and ground equipment.

The 1964 aerial surveys resulted in recording 254,983 acres of defoliation in New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut and New York. This is an increase of more than 82,000 acres compared with the acreage defoliated in 1963. Most of this year's defoliation occurred in Connecticut, 98,552 acres, and in New York, 97,237 acres. Rhode Island reported 375 acres defoliated this year, the first defoliation reported from that State since 1946.

Fiscal Year 1964

Regulatory services were provided throughout the year. This phase of the program involved field inspections of nearly 61,000 acres of nursery and other premises; and 8,005 inspections of processing, industry and shipping sites. Nursery establishments applied control treatments on 2,421 acres of growing plots and borders to maintain certification status. More than 250 establishments and dealers were authorized to move mined, manufactured or quarried stone and quarry products under Certificate of Exemption.

The New York State Gypsy Moth quarantine was amended June 5, 1964, designating for the first time one town in Franklin County and two towns in Hamilton County as generally infested.

Fiscal Year 1964

Regulatory services were provided throughout the year to more than one thousand establishments shipping plants with soil and other regulated products.

To reduce beetle populations and hazards of spreading infestation residual soil treatments were applied voluntarily on 1,395 acres by four military and five commercial airfield operators.

During the adult flight season one airfield in the Eastern Region (Philadelphia International) was officially declared hazardous. The Floyd Bennett Naval Station reached hazardous status but timely application of treatments effectively reduced populations. Aircraft departing eight other airfields and stopping enroute to non-regulated destinations at airfields in Ohio declared hazardous, required treatment prior to departure. These ten fields participated in the application of a total of 1,738 aircraft treatments during the period July 2 - August 30. Suppressive foliar treatments, involving over 17,000 gallons of spray (16,000 DDT and 1,000 Sevin) were applied one or more times at each of 28 military and commercial airfields.

Regulatory action during the adult season was again necessary in seven southwestern Virginia counties from which green beans and cabbage are shipped. The State of Virginia and growers applied foliage sprays in fields and along highways over which such products are moved via trucks. The State-Federal regulatory action involved certification of farm products with an estimated value of \$90,000.

During the period July 1 - September 6, 1963, an extensive trapping survey was conducted in the non-regulated sections of Maine, 787 traps being utilized in eight counties. Survey resulted in the trapping of 13 beetles at Bangor, and one each in traps at Skowhegan and Camden. Dieldrin soil treatments were cooperatively applied at these locations.

1911

1911

1911

1911

1911

1911

Fiscal Year 1964

Surveys for khapra beetle were conducted throughout the year. Properties inspected in the States of Maine, New Hampshire, New Jersey, Pennsylvania, Maryland, Delaware and Virginia totaled 330. Although numerous specimens were collected and submitted for identification, all findings were negative.

At the request of the Plant Quarantine Division, authorized regulatory treatments were applied to commodity lots in connection with off-loaded cargo from ships found to be infested after being unloaded. This necessitated tracing shipments, placing hold orders, and having receivers apply authorized treatments. The most notable actions involved sanitation and fumigation measures at an establishment in Pennsylvania where two silos containing 2,000 tons of cocoa beans were fumigated, and at a plant in New York State where 17 carloads of cocoa beans were similarly treated.

Fiscal Year 1964

Cooperative Federal-State soil sampling surveys were made in Virginia where this pest is known to occur and in New Jersey. No infestation has been found in the latter state. Surveys for delimiting as well as detection purposes were made in the Virginia counties of Princess Anne, Isle of Wight, Nansemond, Norfolk and Southampton where emphasis was placed on lands adjacent to or in the vicinity of known infested properties. Positive findings were recorded in the counties of Princess Anne, Nansemond, Isle of Wight and Norfolk. This marked the first year of positive findings in Norfolk and Princess Anne Counties. A less intensive survey was conducted in ten of the northern Virginia counties, as well as in the Eastern Shore counties of Northampton and Accomack. These counties were worked on a one field per property basis wherein the field with the longest soybean growing history was selected for sampling. Results were negative. During this year's surveys a total of 24,470 soil samples was collected on 1,324 properties involving 21,680 acres of Virginia crop lands. In New Jersey, a detection survey was conducted at selected sites in major soybean areas, soil samples being collected in fields where plants showed yellowing or other unusual symptoms. A total of 480 properties with an estimated acreage of 10,742 was surveyed.

During this period, 301 properties were under Federal and/or State quarantine in parts of three infested counties in Virginia. State and Federal regulatory measures were enforced to control movement of farm machinery, equipment and other products and articles considered a spread hazard. A total of 2,636 commodity lots was approved for movement from infested properties under certificates or limited permits. A total of 753 visits was made to 412 processing and industrial sites for certification.

The Virginia Agricultural Experiment Station, Holland, Virginia, continued their cooperative participation in related studies and experimental undertakings of interest and assistance.

Fiscal Year 1964

Surveys for this pest were conducted in New Jersey, Delaware, Maryland, Pennsylvania, Virginia, West Virginia, and the District of Columbia. Principal emphasis was in Virginia where surveys in the fall of 1962 resulted in the discovery of infestation in the city of Norfolk. Continued surveys this year resulted in the finding of 19 infested locations in Norfolk and 36 locations in Virginia Beach, with an involved total acreage of 7,035. Surveys conducted in states other than Virginia, as well as in the previously infested locations in Greenville County, Virginia, proved negative.

A total of 51 acres was treated for eradication in the Norfolk-Oceana area. In late July 1963, the Navy treated 20 acres with 10% granular dieldrin at the Armed Forces Staff College in Norfolk, Virginia, in a new housing area that was excluded from the 1963 spring treatment program due to construction in progress at that time. In the spring of 1964, approximately 11 acres were treated at the Diamond Springs Truck Experiment Station by station personnel. An additional 20 acres were treated by a nursery as a protective measure.

Fiscal Year 1964

Observations for witchweed were made at 5,981 properties in seven states. Particular attention was directed to the extensive corn producing areas in the southern section of the Region. In Virginia, the survey covered the ten major tobacco growing counties since there was indication of movement of tobacco transplants from areas of North Carolina involved in the witchweed program. Checks were made of host plants, such as crab grass, in the vicinity of tobacco fields and in corn fields. In West Virginia, the survey covered the major corn producing areas with spot checks throughout the state. Similar surveys, though on a less intensive basis, were conducted in corn growing areas of Delaware, Maryland, New Jersey, New York and Pennsylvania.

Fiscal Year 1964

Investigations undertaken in Fiscal Year 1964 were conducted with the aid and cooperation of State and Federal government agencies and private industry. Although the major amount of effort was devoted to numerous problems associated with the gypsy moth program, needs on other programs were given due attention.

GYPSY MOTHRadiological Sterilization

Tests were initiated near Plymouth, Massachusetts in mid-July on eight two-acre plots. Male pupae irradiated at 20,000 roentgens for 4.3 minutes were released at dilution rates approximately 10:1, 17:1 and 30:1 irradiated males versus normal females. Mating results were very encouraging. Hatch from egg clusters was greater than expected; however, in many of the clusters hatch occurred in only 1% to 10% of the eggs. Comparison of total egg hatch to numbers of embryonated eggs showed reductions of as high as 82% of emerging larvae.

Chemosterilants

In tests using tepa, metepa and apholate, the dipping of eggs and pupae and the use of topical applications failed to produce the desired results. Exposure of male moths to residual films of tepa and metepa for varying periods of time were promising. Normal females mated with males which had been exposed to residues of 10 milligrams (mg) of metepa per one-half pint bottle produced no viable eggs. Normal females when mated with males exposed to tepa at 10 mg per one-half pint bottle produced no viable eggs. However, with tepa a .3% hatch was observed at the 50 mg level. When both sexes were exposed to 50 mg of tepa no viable eggs were produced. Residual treatments with apholate did not appear promising. The only apholate test series producing consistently low or non-hatch was noted when both sexes were treated with 50 mg per one-half pint bottle.

Insecticidal Investigations

Tests completed using the organic carbamate Zectran at low concentrations in either water or oil base sprays applied aerially at the rate of one gallon per acre showed that only in plots treated with 4-6 ounces of insecticide per acre was control promising. Sevin 80-S was determined to provide equal effectiveness in either oil or water base sprays.

Initial observations of aerial spray tests utilizing low volume application of technical malathion did not appear promising at dosages of up to one pound per acre.

Tests aimed at simplifying Sevin formulations and increasing residual qualities were conducted in the laboratory. UCAR resins 680, 40 and 480 were compared with two ounces UCAR WC-130 plus two ounces of Rhoplex B-15 and with UCAR WC-130 alone. UCAR 680 was judged superior in residual characteristics and suspension qualities.

Biological Control

In an attempt to suppress the gypsy moth through biological means, 108 field collected Calosoma sycophanta and 2,700 Sturmia scutellata were released in New Jersey. Mass rearing of the egg parasite Ooencyrtus kuwanai was undertaken at Waterbury, Connecticut. Over ten gallons of gypsy moth eggs were required to rear 825,000 of these parasites. Approximately 5,000 were released by the Division of Plant Industry personnel at each positive trap site in New Jersey.

In cooperation with the Parasite Introduction and Insect Identification Branch, ENT, and under the auspices of the PL 480 program, three parasites were introduced from Spain. Colonization attempts were made as follows:

<u>Apanteles vitripennis</u>		<u>Tricholyga segregata</u>		<u>Brachymeria intermedia</u>	
Connecticut	2,862	New Jersey	5,780	New Jersey	1,356
New Jersey	36	New York	2,200	New York	1,550
		Vermont	2,400		

An aerial saturation trapping program was initiated on June 22. Traps were to be dropped in 33 separate blocks totaling 94,365 acres in New Jersey, and 5 blocks totaling 5,664 acres in New York. Traps were dropped at a 1/16th mile spacing. Three separate drops were scheduled at 21 day intervals in order to span the entire period of male moth activity.

Gyplure

Cooperation continued with Entomology Research Division to develop specification analyses of gyplure for production by commercial concerns. Variability between individual formulations of the lure was encountered and tests were conducted to determine the effect of various impurities. Aging and weathering tests were also conducted. Various new liquid and granular formulations of gyplure for dispersal by aircraft were investigated. Of these, corn cob grits and polyethylene coated granules showed the most promise.

BARBERRY ERADICATION

Test plots were established in Potter County, Pennsylvania and Tazewell County, Virginia to determine the effectiveness of several new herbicides against Berberis vulgaris and Berberis canadensis. Replicate plots are being used to compare these products in oil, water emulsion and granular formulations with presently recommended materials.

JAPANESE BEETLE

Twenty colonies of the Japanese Beetle parasite, Tiphia vernalis, were collected at Grafton, West Virginia and shipped to locations in the Central and Southern Regions where it is not yet known to occur. Three additional colonies collected by the State of West Virginia were released near Parsons, West Virginia.

GOLDEN NEMATODE

Tests of the effectiveness of the present Vapam drench treatment indicate that the many variables existing in the application are having a direct effect on the degree of mortality obtained.

The use of dyes to assist in viability determinations did not look promising. However, preliminary studies using electrical stimulation indicate definite promise.

EUROPEAN CHAFER

Foliage applications against adult European chafer indicated Sevin to be superior to Zectran. However, neither material proved to be satisfactory from a residual standpoint.

Fiscal Year 1964

Close cooperation was maintained with liaison officers throughout the Region. Each liaison officer was thoroughly briefed on all major control efforts involving the use of pesticides.

As a result of discussions between representatives of the Plant Pest Control Division, and the States of Pennsylvania and New Jersey at the Eastern Plant Board meeting held in Boston, Massachusetts, March 11-13, 1964, it was determined that a need existed to develop information on the effect on the total environment of applying Sevin insecticide for gypsy moth control. The Departments of Agriculture of these States responded by soliciting assistance from other State agencies who had an interest in the problem and who could provide technically qualified personnel for the type of investigation envisioned.

<u>State</u>	<u>Agency Participation</u>	<u>Type of Investigation</u>
New Jersey	Delaware River Basin Commission and State Health Dept. cooperating	Water Contamination
	Dept. of Conservation and Economic Development	Effect on Wildlife and Fish
	Rutgers University	Effect on Non-target terrestrial insects
<hr/>		
Pennsylvania	Department of Health	a. Water Contamination b. Air Pollution
	Game and Fish Commission	Effect on wildlife and fish
	Pennsylvania State University	Effect on aquatic invertebrates

The New Jersey State Health Department also made general observations on the overall conduct of the control program and adherence to recommended safety precautions.

Investigations were conducted of fish kills in the James River, Virginia; Blackwood Lake, New Jersey and Crab Creek, Maryland. Industrial wastes were suspected to have been the cause in the James River and in Blackwood Lake. No determination was made as to the causative agent in Crab Creek, but pesticides were ruled out.

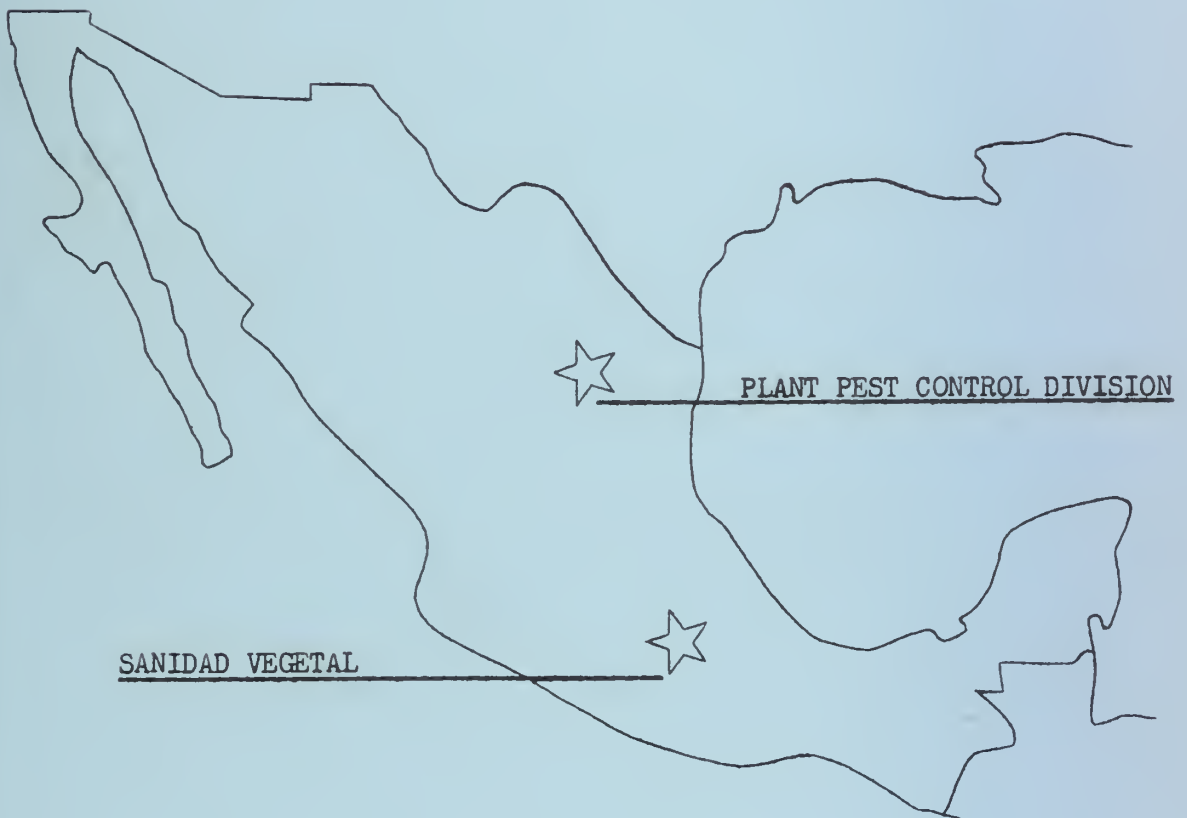


MEXICO REGION

PLANT PEST CONTROL DIVISION - A.R.S. - U.S.D.A.

IN COOPERATION WITH

SANIDAD VEGETAL - S. A. G.



ANNUAL REPORT

FISCAL YEAR 1964

PLANT PEST CONTROL
COOPERATIVE PROGRAMS

MEXICO REGION

ANNUAL REPORT

FISCAL YEAR

1964

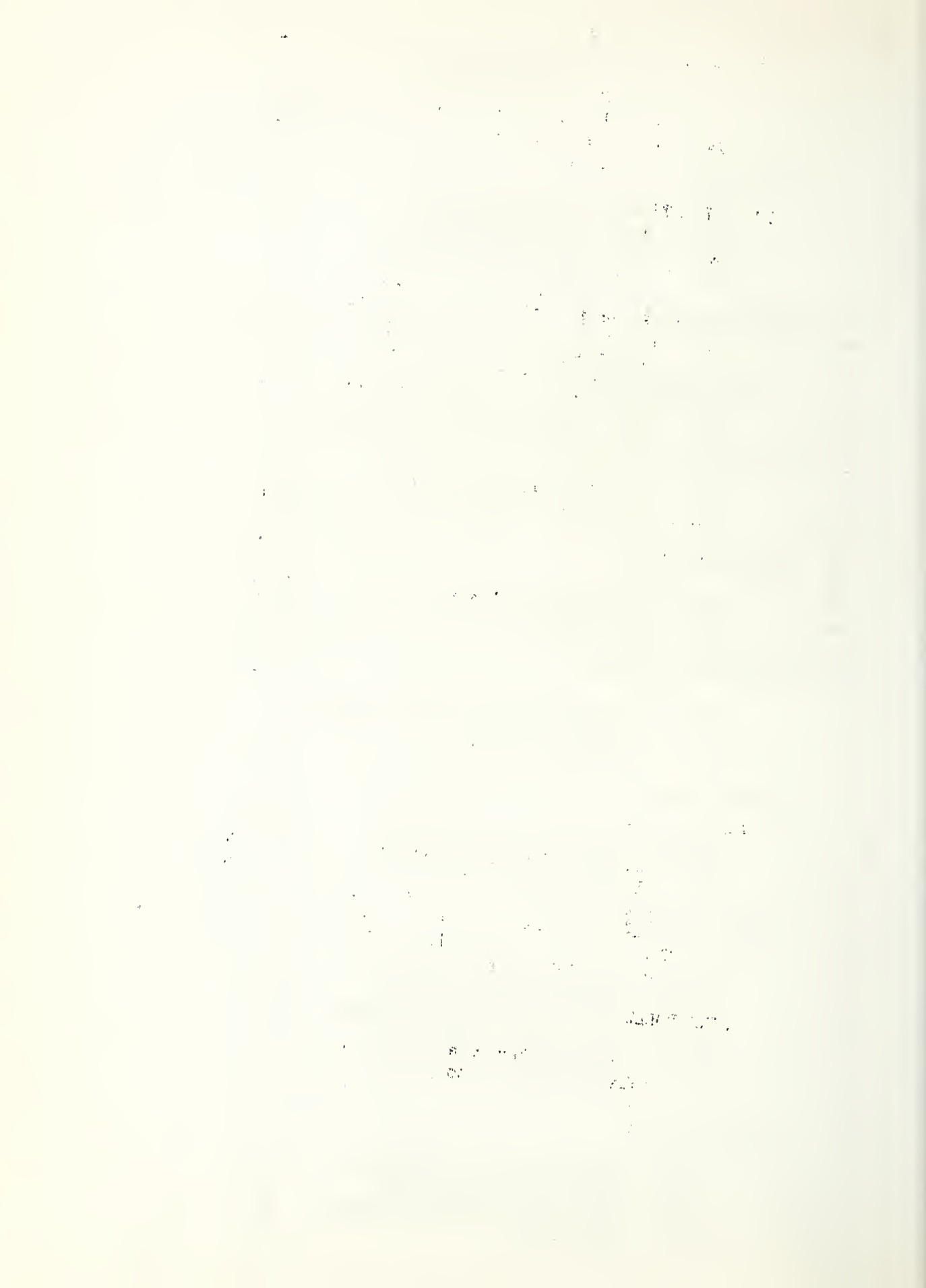
United States Department of Agriculture
Agricultural Research Service
Plant Pest Control Division

PLANT PEST CONTROL COOPERATIVE PROGRAMS

In accordance with our Memorandum of Understanding with Mexico, the Plant Pest Control Division of the United States Department of Agriculture and the Sanidad Vegetal of the Mexican Department of Agriculture and Livestock cooperated in the preparation of work plans and the accomplishment of the Mexican Fruit Fly, Citrus Blackfly, Khapra Beetle, Mediterranean Fruit Fly, Pink Bollworm and Boll Weevil programs of the Mexico Region.

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BOLL WEEVIL

Surveys for detection, for winter survival, for intensity of infestation, and for study were carried out in the States of Chihuahua and Sonora. Infestations in places not previously known to be infested were found in a limited area of the Juarez, Chihuahua Valley, across from El Paso, Texas, and in the Villa Ahumada, Carmel, San Buena Ventura section of Chihuahua, which begins some 85 miles south of Juarez, Chihuahua. The infestation in the Juarez Valley was found late in September and in the other Chihuahua area mentioned, in December.

To halt the westward spread of the boll weevil in Chihuahua, and the northern spread of the Sonora weevil, liquid methyl parathion at the rate of 1/2 lb. of the technical material mixed with 11 quarts of water was applied per acre to cotton plantings in the Upper Big Bend Chihuahua section; the infested area in the Juarez Chihuahua Valley area, and in North Central Sonora to the area roughly designated as the Magdalena-Atil sections. These insecticidal applications were made in the Fall and were aimed at eradicating or reducing populations of diapausing weevil.

1990

BOLL WEEVIL

SURVEY AND DETECTION

SUMMARY

F. Y. 1964

S T A T E	S U R V E Y E D		I N F E S T E D		Specimens Collected
	Properties	Acres*	Properties	Acres	
Chihuahua	678	23,888	74	1,184	704
Sonora	523	20,433	404	18,105	4,614
Baja California	23	0	0	0	0
T O T A L	1,224	44,321	478	19,289	5,318

* Not required on PPC 7-27 reporting

1. The first part of the report is a general introduction to the subject of the study. It discusses the importance of the study and the objectives of the research.

2. The second part of the report is a detailed description of the methodology used in the study. It includes information about the sample size, the data collection methods, and the statistical analysis techniques.

3. The third part of the report is a presentation of the results of the study. It includes tables and graphs showing the data and the findings of the research.

4. The fourth part of the report is a discussion of the results and their implications. It discusses the strengths and limitations of the study and provides suggestions for future research.

5. The fifth part of the report is a conclusion. It summarizes the main findings of the study and provides a final statement on the importance of the research.

6. The sixth part of the report is a list of references. It includes all the sources of information used in the study, such as books, articles, and websites.

7. The seventh part of the report is an appendix. It includes any additional information that is relevant to the study, such as raw data, questionnaires, and interview transcripts.

8. The eighth part of the report is a glossary. It defines the key terms and concepts used in the study, ensuring that the reader understands the language of the report.

BOLL WEEVIL

DEBRIS INSPECTION FOR

OVERWINTERING ADULTS

SUMMARY

F. Y. 1964

S T A T E	Collection Area	Fields Surveyed		Sq. Yds. Inspected		Boll Weevil Found	
		Treated	Untreated	Treated	Untreated	Treated	Untreated
Chihuahua	(January 1964) Guadalupe	10	0	57	0	2	0
Chihuahua	Ojinaga	11	4	69	29	29	5
Sonora	<u>First Inspection 2/1-14/64</u> Imuris-Magdalena-Saric	19	4	148	26	5	1
Sonora	Santa Ana-Caborca-La Salina- Altar		7		48		4
Sonora	<u>Second Inspection 4/13-29/64</u> Imuris-Magdalena-Saric	19	4	148	32	4	1
Sonora	Santa Ana-Caborca-La Salina- Altar		7		50		2
T O T A L		59	26	422	185	40	13

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BOLL WEEVIL

CONTROL ACCOMPLISHMENTS

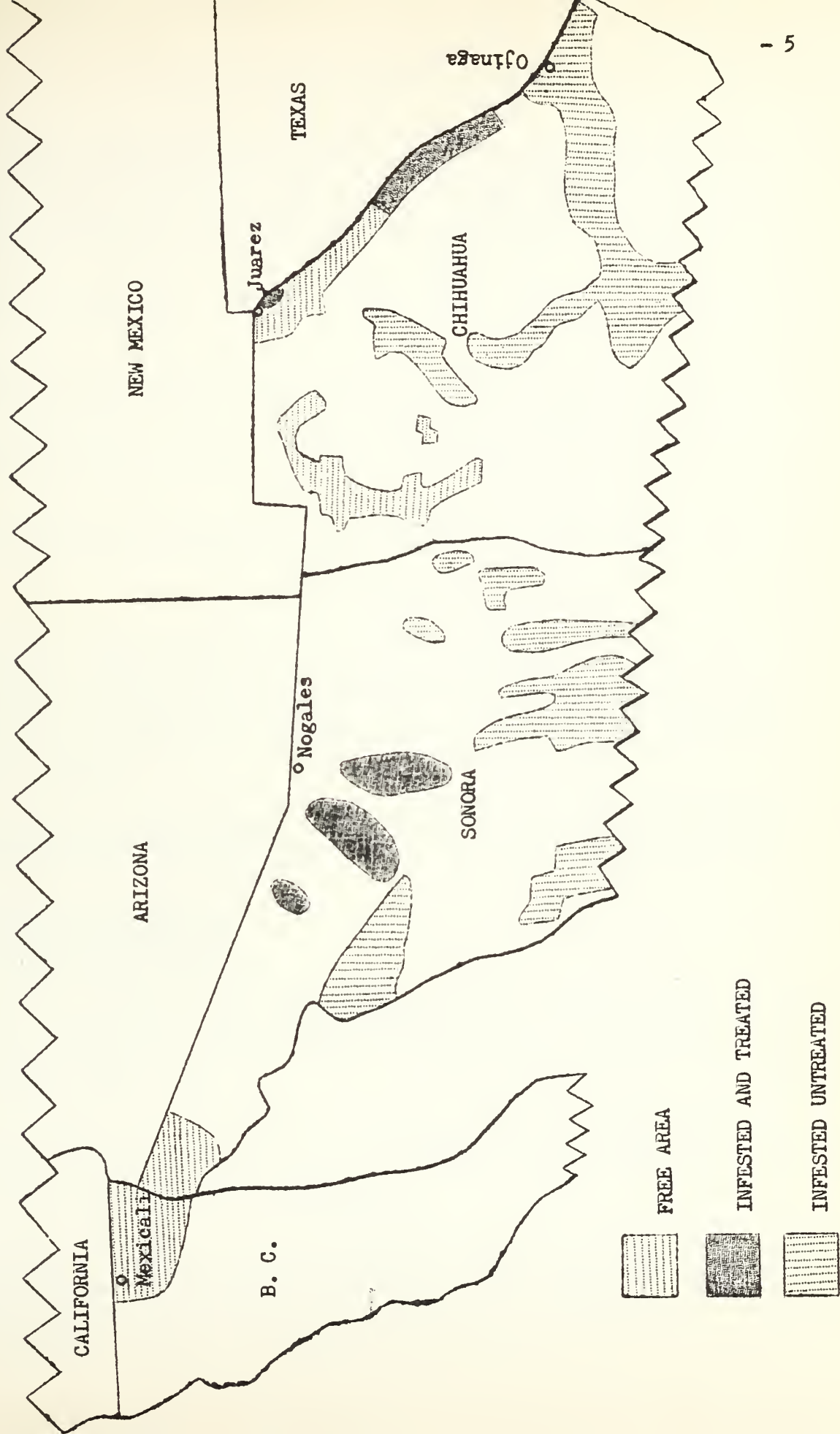
TREATMENT PROGRAM FALL 1963

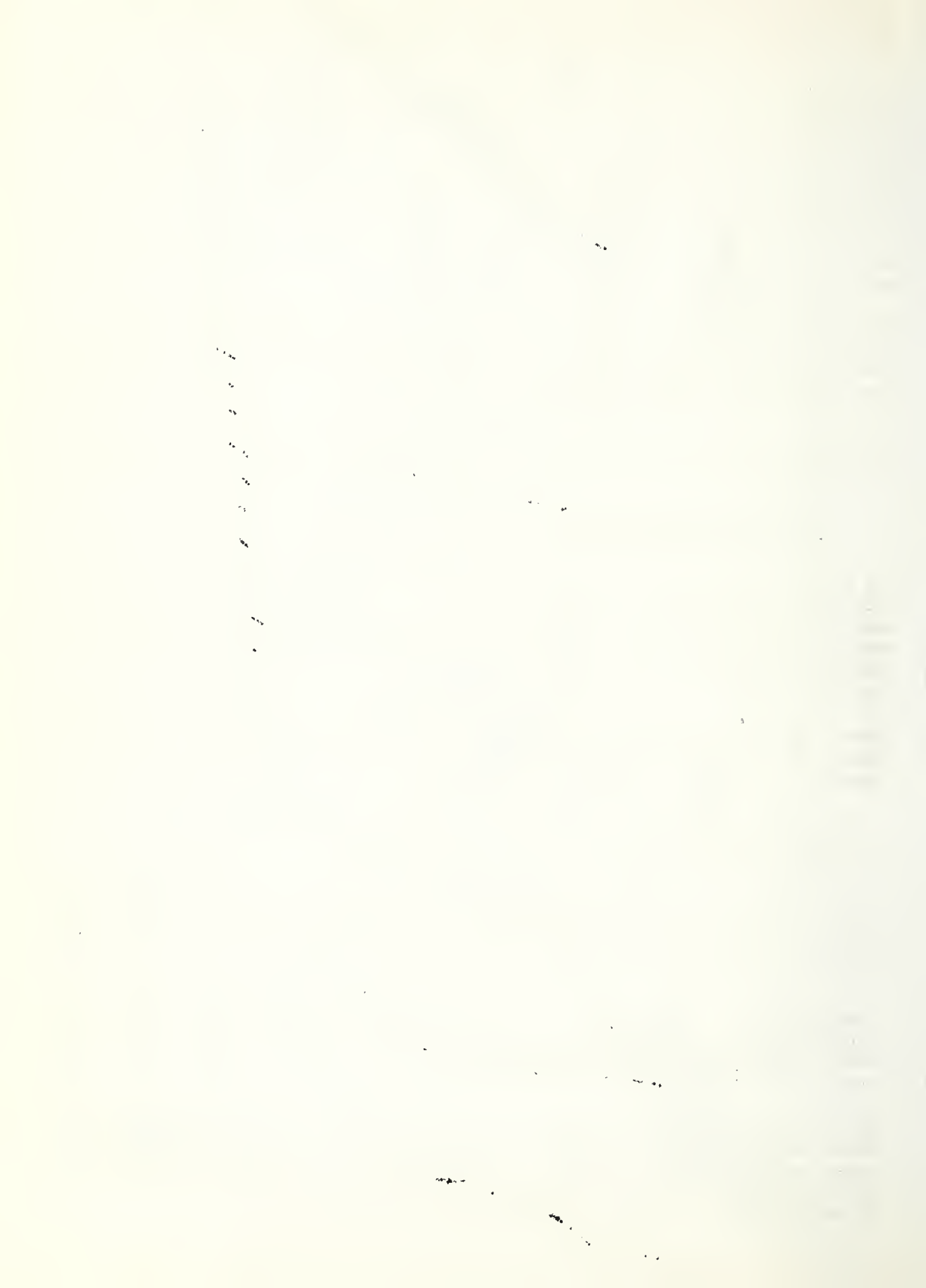
SUMMARY

F. Y. 1964.

S T A T E	Number of Properties Treated	I N S E C T I C I D E	
		Acres Treated	
		Ground	Air
Chihuahua	1,153	164	10,911
Sonora	963	51	12,718
TOTAL	2,116	215	23,629

BOLL WEEVIL PROGRAM





The greater part of the citrus producing areas of Mexico is generally infested with citrus blackfly and is under biological control. However the States of Baja California, Nuevo Leon, Sonora (north of Hermosillo), and Tamaulipas (north of Cd. Victoria) are designated as chemical control zones. These citrus producing areas are adjacent to citrus producing areas of the United States in the States of California, Arizona and Texas.

Surveys for detection of the citrus blackfly are carried on throughout the year in the chemical control zones.

During the year two light infestations of the citrus blackfly were found in the State of Nuevo Leon. One in October 1963 and the other in June 1964. Spray applications of trithion were begun almost immediately in both cases. The October infestation was eradicated, and spray operations begun in June on the June finding promised to obtain the same result.

Any infestations of citrus blackfly found in the chemical control zone are treated with the insecticide trithion with eradication being the objective.

CITRUS BLACKFLY (BIOLOGICAL CONTROL)

All of the citrus producing areas of Mexico except Northern Sonora, Baja California, Nuevo Leon and Northern 2/3rds of the State of Tamaulipas are generally infested by the citrus blackfly. The generally infested area of Mexico is designated as a biological control zone, and commercial control is obtained through the use of parasites introduced into Mexico some years ago for that purpose.

There are three parasites, of the several that were originally introduced into Mexico that have prospered, and their use has resulted in generally good commercial control. They are:

1. Prospaltella opulenta
2. Amitus hesperidum
3. Prospaltella clypealis

It has been determined that Prospaltella opulenta thrives and does better in all climatic conditions of Mexico than either of the other two. Therefore, effort is being directed toward establishing the Prospaltella opulenta in all of the biological control zone.

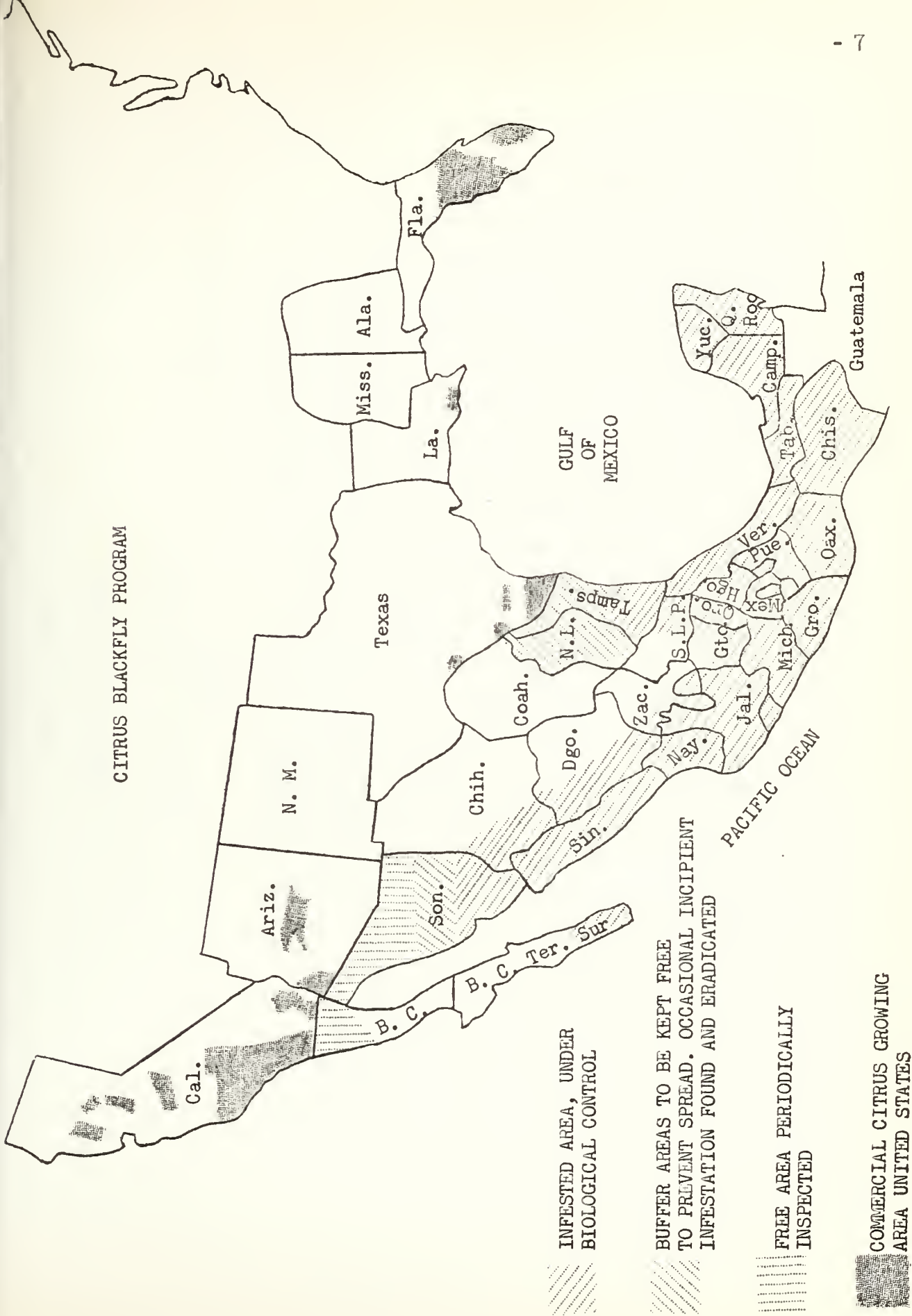
Characteristic of the biological control is the fluctuations that occur. A constant survey is carried out to check on this, and when areas of high parasitization are found, captures of parasites are made for release where surveys have shown low parasitization of infestations.

One problem that occurs in the biological control of citrus blackfly persists. Parasites are decimated in infested groves in those instances where cotton or other crops are planted adjacent to citrus groves. Insecticides applied to these plantings drift into the groves and kill the parasites. Increasing use of sprays gives promise of improving this situation.

CITRUS BLACKFLY
No. 2, CONT.

Regulatory operations include inspection to intercept and destroy any citrus blackfly infested citrus leaves for certification of citrus destined for shipment through the United States. Also road stations are maintained to inspect citrus shipments of infested leaves in citrus moving from the biological control zone into the chemical control zone.

CITRUS BLACKFLY PROGRAM



CITRUS BLACKFLY
SURVEY AND DETECTION

(BIOLOGICAL CONTROL ZONE)

SUMMARY
F. Y. 1964

S T A T E	NUMBER SURVEYED		NUMBER INFESTED	
	Properties	Hosts	Properties	Hosts
Tamaulipas	1,287	513,040	372	12,869
T O T A L	1,287	513,040*	372	12,869

* Includes 883 nursery trees.

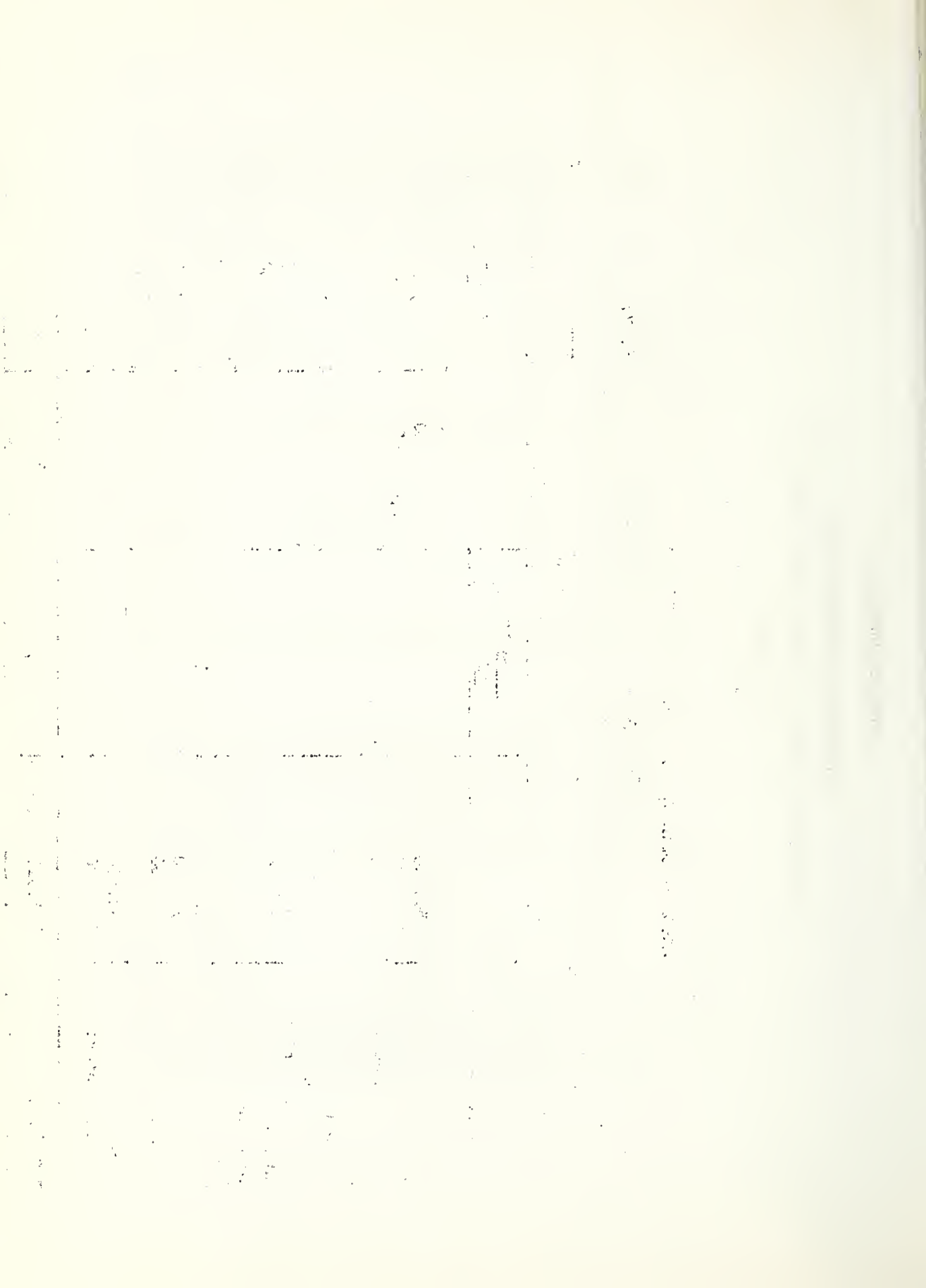
CITRUS BLACKFLY

COLONIZATION OF PARASITES
BY SANIDAD VEGETAL IN BIOLOGICAL CONTROL ZONE

SUMMARY

F. Y. 1964

S T A T E	P A R A S I T E S C O L O N I Z E D			
	<u>Prospaltella</u> <u>opulenta</u>	<u>Prospaltella</u> <u>Clypealis</u>	<u>Amitus</u> <u>Hesperidium</u>	Total by State
Tamaulipas	36,100		5,000	41,100
Veracruz	814,400	2,000	1,019,000	1,835,400
Baja California	67,300			67,300
Puebla	775			775
Yucatan	476,600			476,600
Quintana Roo (Terr.)	191,000			191,000
Yucatan-Quintana Roo	262,200			262,200
Tabasco	26,600			26,600
Michoacan	216,000			216,000
Oaxaca	25,000			25,000
Sonora	40,940	1,430		42,370
Durango	52,000			52,000
Jalisco	70,000			70,000
Colima			4,000	4,000
Guanaajuato	58,300		22,000	80,300
San Luis Potosi	104,300			104,300
T O T A L	2,441,515	3,430	1,050,000	3,494,945



CITRUS BLACKFLY
SURVEY AND DETECTION
(CHEMICAL CONTROL ZONE)

SUMMARY

F. Y. 1964

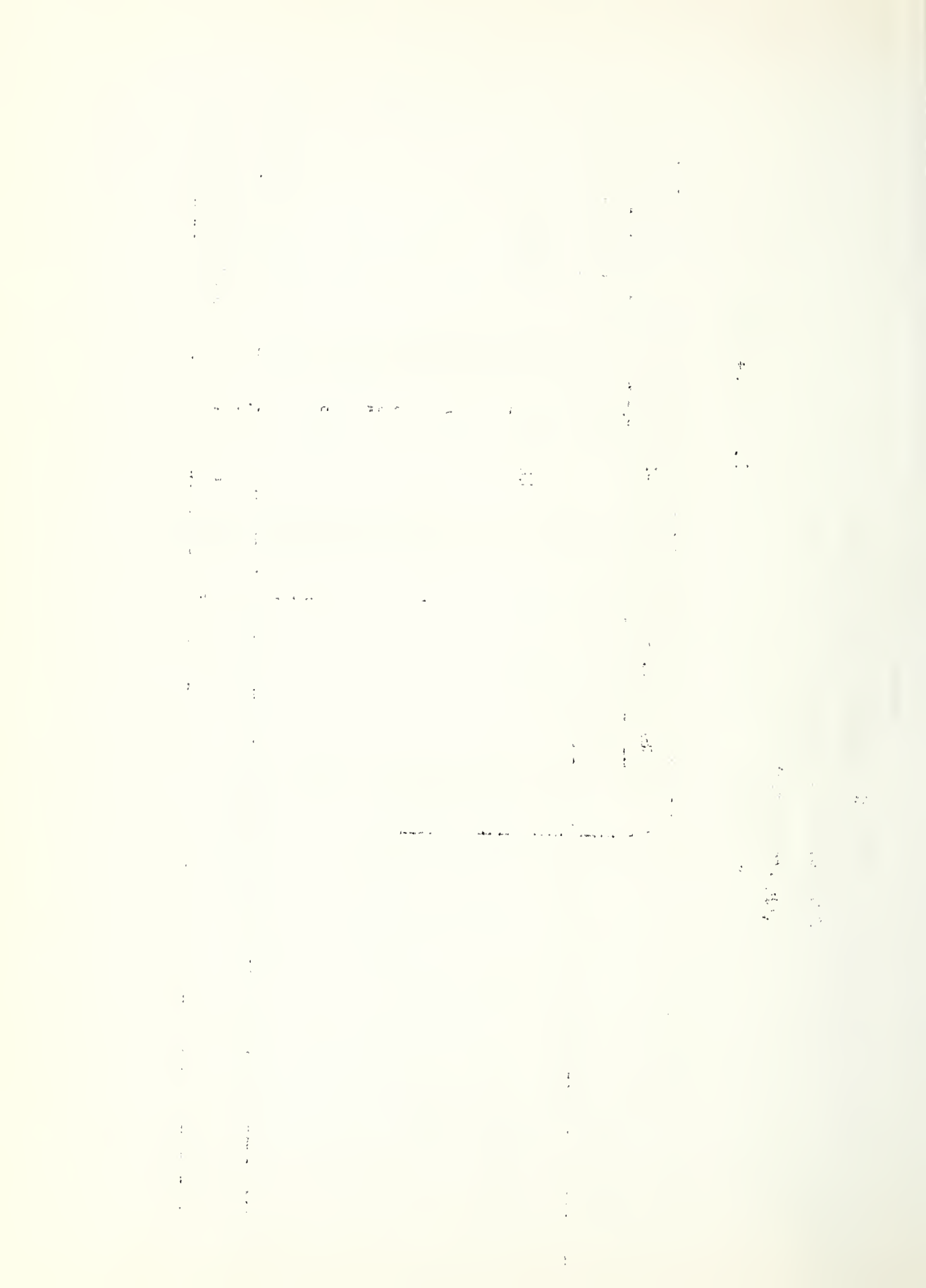
S T A T E	NUMBER SURVEYED		NUMBER INFESTED	
	Properties	Hosts	Properties	Hosts
Nuevo Leon	4,918	1,015,863	5	15
Tamaulipas	7,523	61,631	0	0
Sonora	3,411	77,168	0	0
Baja California	1,970	9,983	0	0
T O T A L	17,822	1,164,645	5	15

CITRUS BLACKFLY
REGULATORY ACTIVITIES
(CHEMICAL ZONE)

SUMMARY

F. Y. 1964

S T A T E	INSPECTION FOR CERTIFICATION			Std. Boxes of Fruit
	Processing Plants	Other		
Nuevo Leon	21	44		16,807
T O T A L	21	44		16,807



CITRUS BLACKFLY

CONTROL ACCOMPLISHMENTS

(CHEMICAL CONTROL ZONE)

SUMMARY

F. Y. 1964

STATE	I N S E C T I C I D E T R E A T M E N T S	
	Properties Sprayed (Ground)	Host Plants Sprayed
Nuevo Leon	20	2,132
T O T A L	20	2,132

INSECT DETECTION

Survey for detection of the Mediterranean fruit fly were carried out in Mexico at those places considered to be vulnerable to the introduction of this serious insect pest. Special emphasis was given to survey in the State of Chiapas because it is the gateway to Mexico from Mediterranean fruit fly infested Central American Countries. Seaports and many International airports in Mexico were also trapped. All survey results continued negative.

Along with trapping for Mediterranean fruit fly multiple lure traps were placed in operation at many strategic locations. The results of this trapping were also negative.

THEORY

The theory of the present experiment is based on the fact that the rate of change of the concentration of a substance in a closed system is proportional to the concentration of the substance. This is expressed by the following equation:

$$\frac{dC}{dt} = -kC$$

where C is the concentration of the substance, t is time, and k is the rate constant. The integrated form of this equation is:

$$\ln C = -kt + \ln C_0$$

where C_0 is the initial concentration. The rate constant k can be determined from the slope of a plot of $\ln C$ versus t .

MEDITERRANEAN FRUIT FLY

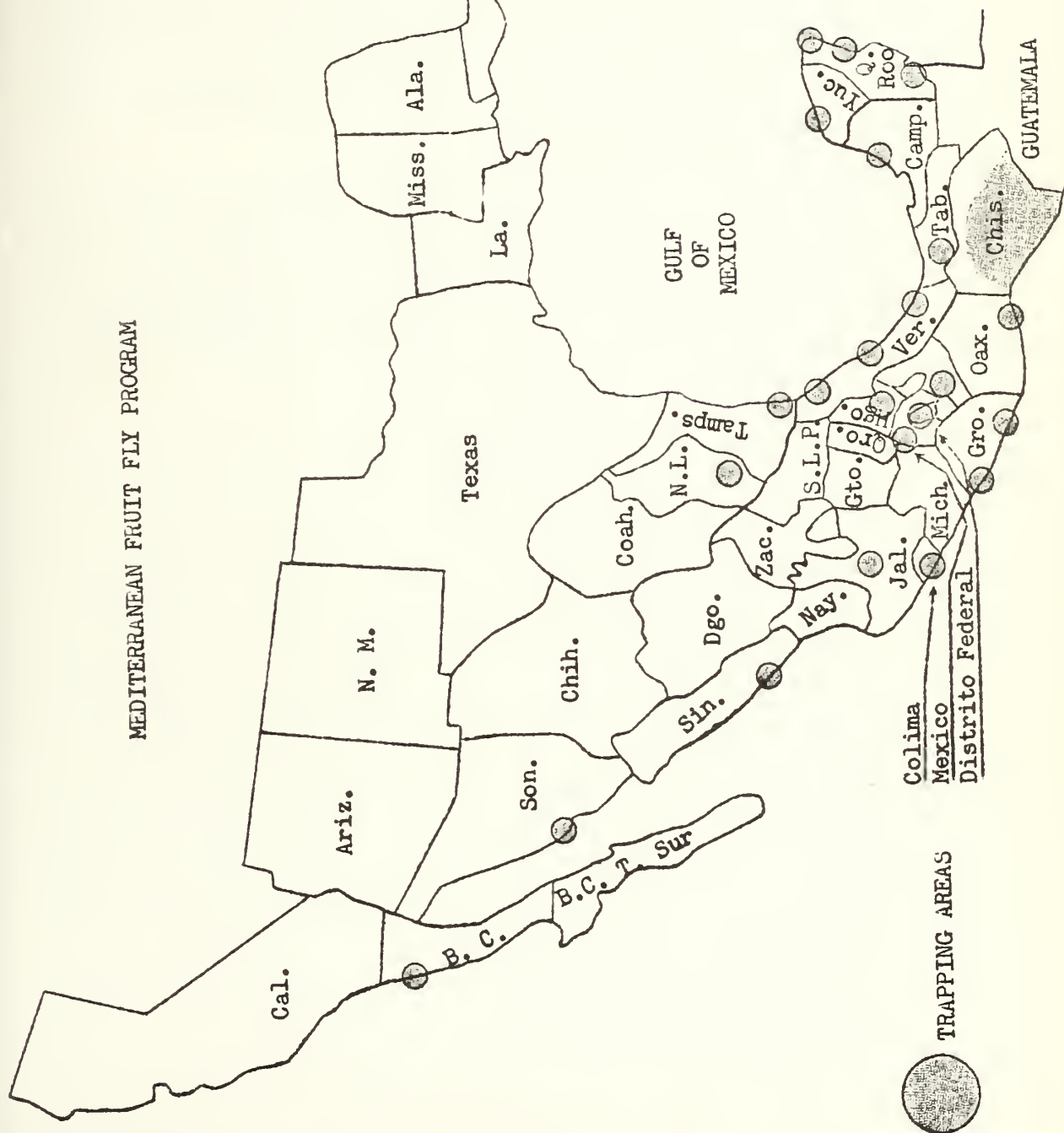
SURVEY AND DETECTION

SUMMARY

F. Y. 1964

S T A T E	N U M B E R O F		
	Traps in Use	Trap Inspections	Positive Specimens
Baja California	25	369	0
Sonora	138	1,856	0
Nuevo Leon	35	602	0
Tamaulipas	144	3,432	0
Sinaloa	40	1,002	0
Veracruz	264	4,447	0
Jalisco	25	600	0
Hidalgo	10	240	0
Colima	20	480	0
Mexico	32	768	0
Puebla	10	240	0
Federal District	59	1,416	0
Guerrero	240	5,760	0
Oaxaca	64	1,536	0
Tabasco	40	960	0
Chiapas	1,972	46,370	0
Campeche	79	1,896	0
Yucatan	368	8,832	0
Quintana Roo (Territory)	132	3,168	0
T O T A L	3,697	83,974	0

MEDITERRANEAN FRUIT FLY PROGRAM



INSPECTION STATIONS

Quarantine inspection stations strategically located were operated to prevent the introduction of certain plant pests into free areas of Mexico adjacent to the States of Texas, New Mexico, Arizona and California. Insects of primary concern were the Mexican Fruit Fly, Pink Bollworm, Boll Weevil, Khapra Beetle, Citrus Blackfly and the Mediterranean Fruit Fly.

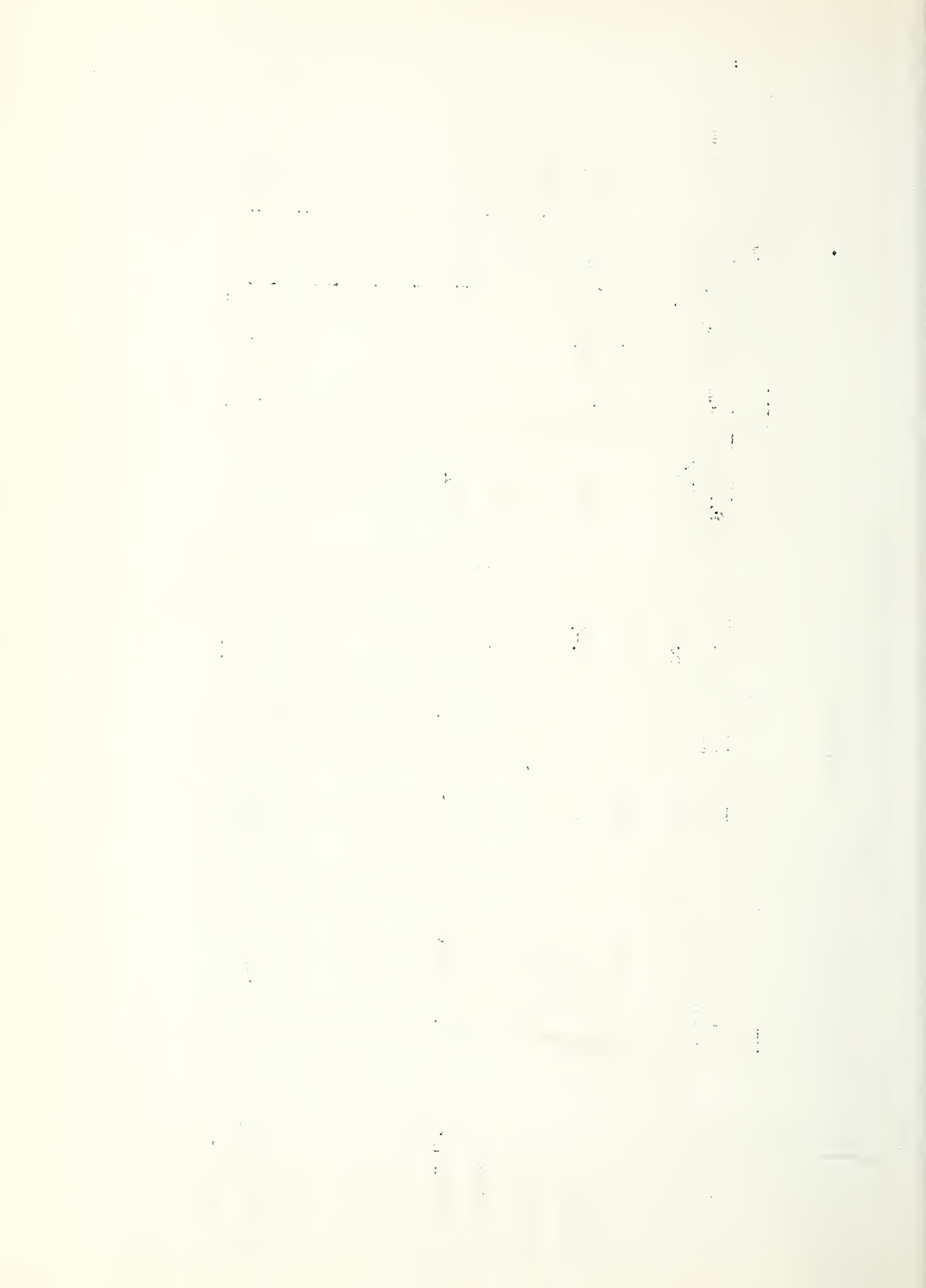
Activities of the inspection stations located on highways, at airports, seaports, and railroad stations included inspection of passenger luggage, box cars, highway vehicles and box cars. Fumigation of commercial shipments of Mexican fruit fly host fruits prior to entering Mexican fruit fly free areas of Northern Sonora and Baja California were made gratis. Other operations involved cleaning or fumigating trucks and box cars contaminated with pink bollworm host material.

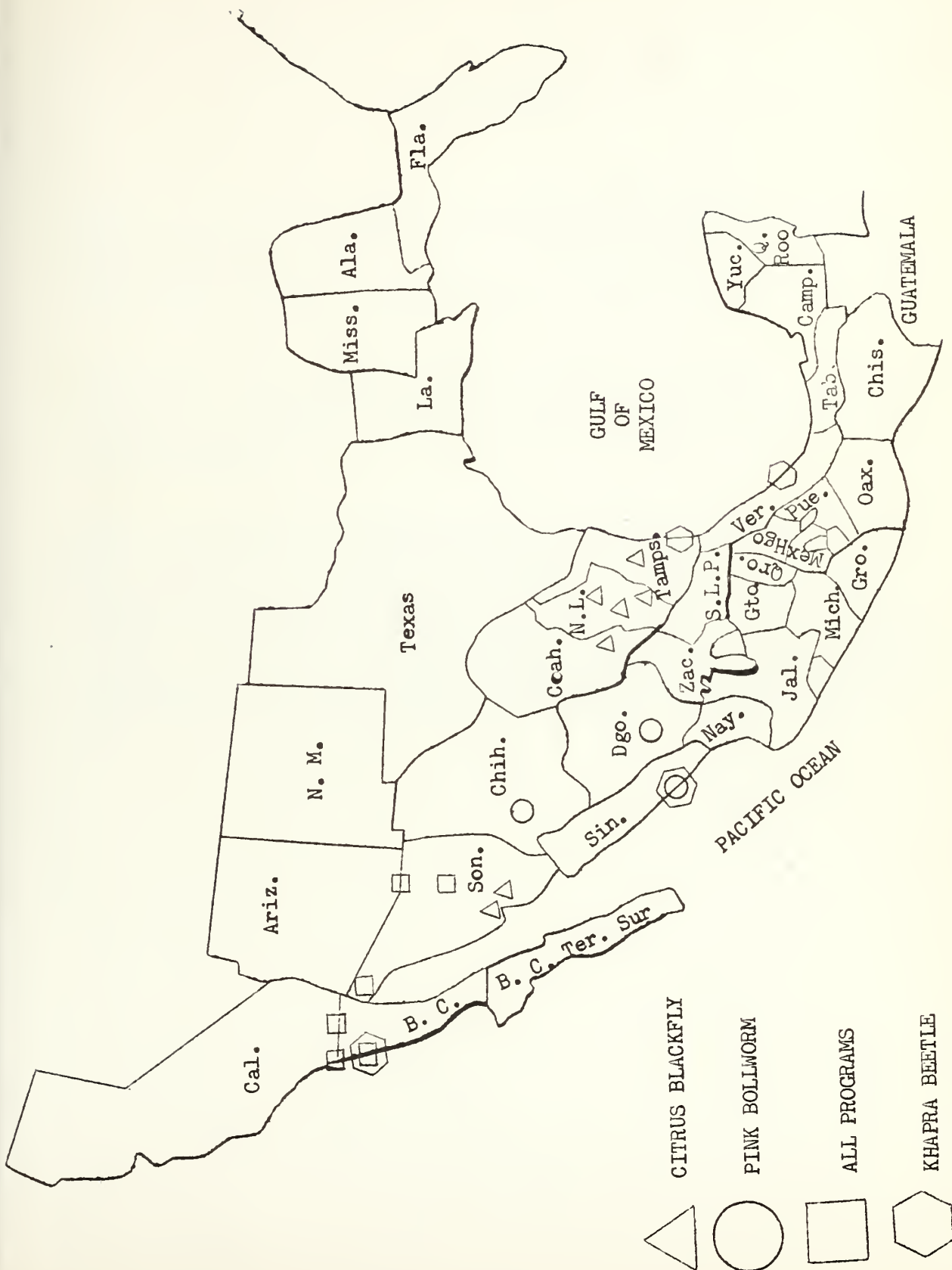
COOPERATIVE QUARANTINE INSPECTION

SUMMARY

F. Y. 1964

S T A T E	N U M B E R O F				H O S T S I N T E R C E P T E D		
	Inspections	Passengers and Braceros	Pieces of Baggage and Express	Vehicles cleaned or fumigated	MFF	CBF	PBW
Baja California	15,839	58,765	282,877	-	6,942	-	1
Sonora	380,170	258,500	32,453	5,533	55,242	502	14,454
Sinaloa	87,773	15,388	-	371	-	-	842
Durango	23,513	-	-	526	-	-	394
Chihuahua	1,001	-	-	4,961	-	-	171
T O T A L	508,296	332,653	315,330	11,391	62,184	502	15,862





- △ CITRUS BLACKFLY
- PINK BOLLWORM
- ALL PROGRAMS
- ⬡ KHAPRA BEETLE

KHAPRA BEETLE

Surveys for detection of the khapra beetle were carried out in several states of Mexico. All property inspections were negative, except that one specimen identified as positive in Mexico was recovered from a flour mill in Juarez, Chihuahua. This mill was reinspected at 90 day intervals with negative results. All sacks from this mill were fumigated and all bran and waste was likewise fumigated.

Regulations of the Sanidad Vegetal requiring the fumigation of all wheat leaving the area from Mexicali, Baja California continued. All used or contaminated bagging arriving at the port of Ensenada, Baja California was fumigated, as well as used sacks circulating in the Mexicali, Baja California Valley.

Inspections for khapra beetle were made of ships arriving at several Mexican ports. All cargo discharged from ships from which suspicious specimens were obtained was required to be fumigated, to avoid the danger of disseminating infested cargo all through Mexico, which could result if positive identifications were awaited before action was taken. This procedure was proved to be satisfactory, and a number of cargo fumigations was made. Previously, before instituting the procedure of fumigating cargo on the basis of positive identification it had been necessary to run down cargo from ships, in many cities and town in Mexico, and fumigate it.

1. The first part of the paper discusses the importance of the study of the history of the English language. It is noted that the English language has a long and rich history, and that the study of its development is essential for a full understanding of the language. The paper then goes on to discuss the various factors that have influenced the development of the English language, such as the influence of other languages, the influence of the social and cultural context, and the influence of the individual writers and speakers.

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KELAPRA BEETLE

SURVEY AND DETECTION

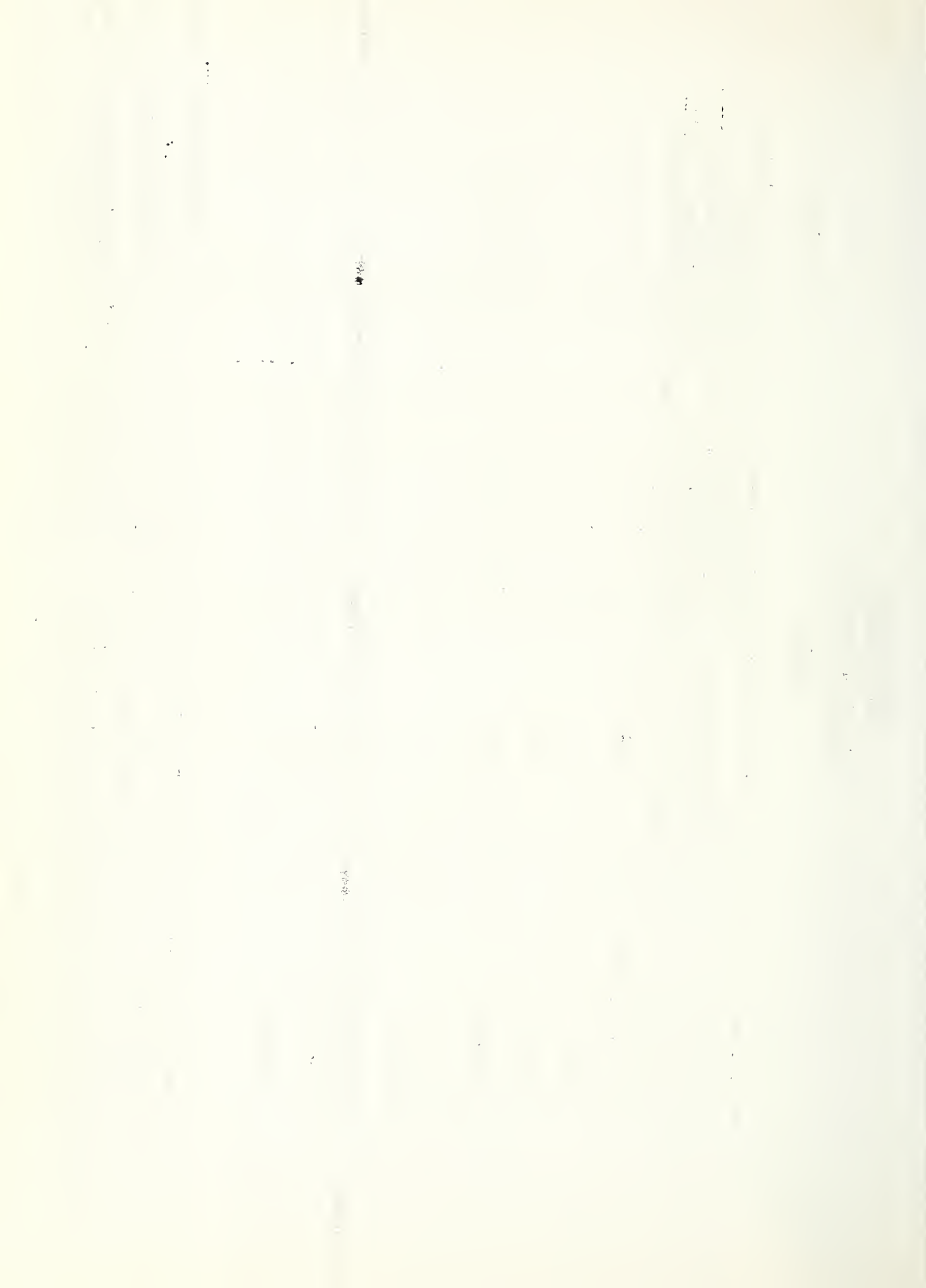
SUMMARY

F. Y. 1964

S T A T E	Number Properties Surveyed	Number Specimen Collections		NUMBER INFESTED	
		Negative	Positive	Properties	Cubic Feet
Baja California	192	50	0	0	0
Sonora	93	6	0	0	0
Sinaloa	38	1	0	0	0
Chihuahua	144	194	1*	1	1,052,097
Coahuila	14	23	0	0	0
Durango	2	23	0	0	0
Nuevo Leon	30	12	0	0	0
Tamaulipas	256	36	0	0	0
Veracruz	151	16	4**	0	0
T O T A L	920	361	5	1	1,052,097

* One specimen identified positive. Extensive reinspections did not reveal more positive specimens. All quarantine commodities in the amount of 108,631 cu. ft. moving from the property were fumigated

** Specimens collected from foreign cargo steam ships.



KHAPRA BEETLE

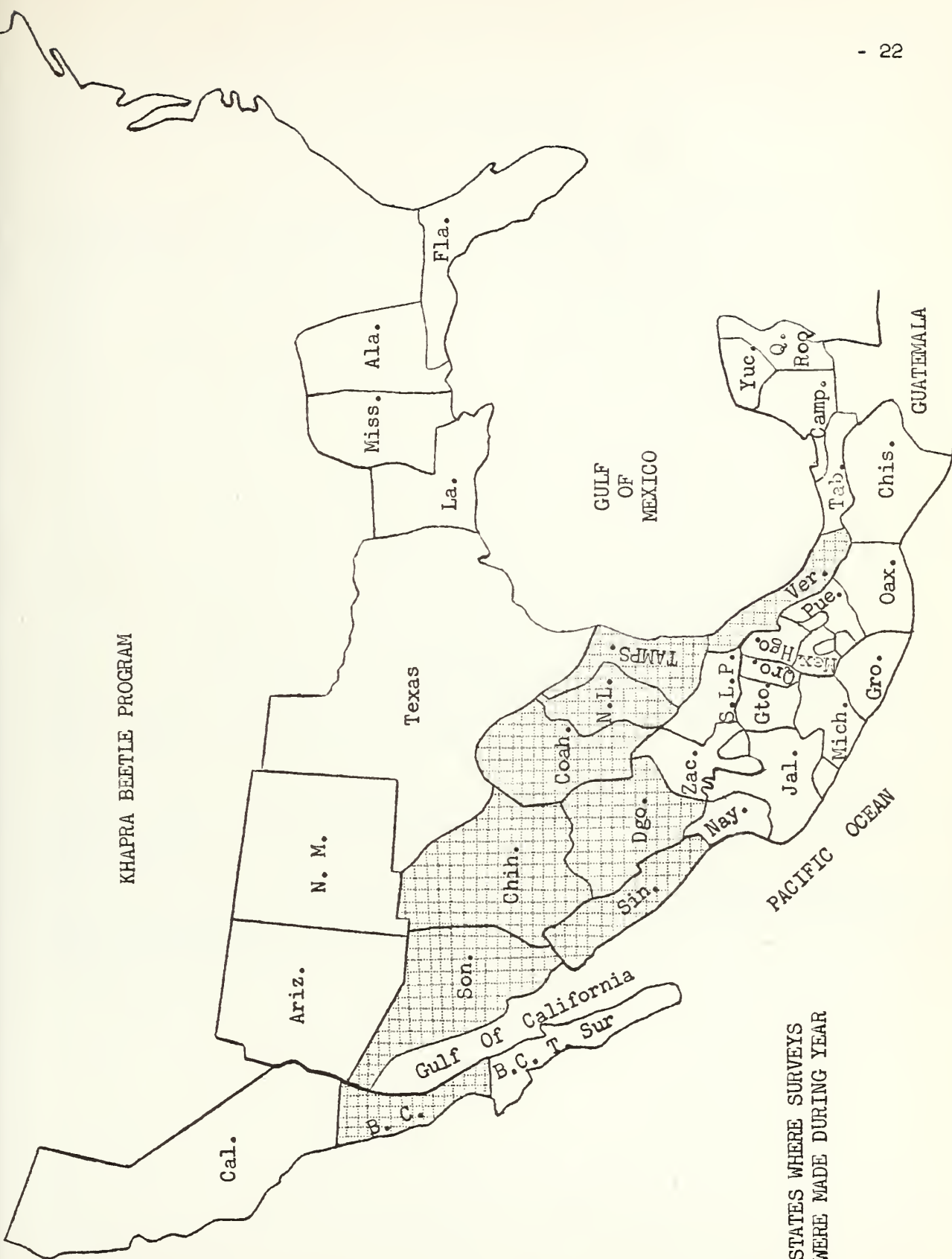
REGULATORY ACTIVITY

SUMMARY

F. Y. 1964

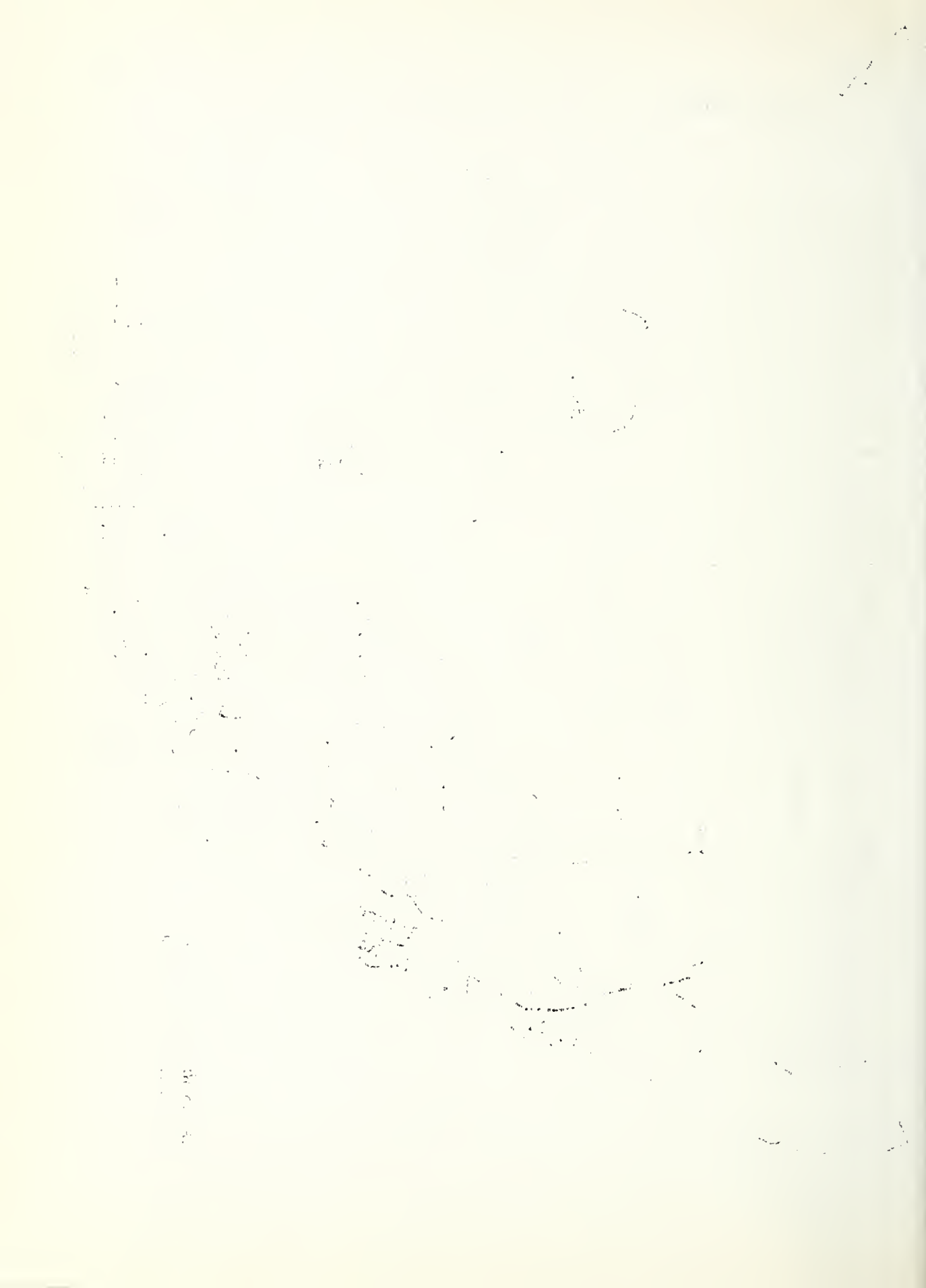
S T A T E	COMMODITY LOTS TREATED		TOTAL ALL TREATMENTS
	Fumigated	Other	
Baja California	2	0	2
Chihuahua	108,631	0	108,631
Tamaulipas	22	0	22
T O T A L	108,655	0	108,655

KHAPRA BEETLE PROGRAM



STATES WHERE SURVEYS
WERE MADE DURING YEAR





MEXICAN FRUIT FLY

The citrus producing States of California and Arizona are apparently free of an infestation of the Mexican fruit fly. Likewise, the adjacent areas of Northern Mexico (Baja California and Northern Sonora) are not known to have an established infestation of this serious pest. However, the volume of traffic, both tourist and commercial, from generally infested areas in South Mexico is enormous. To assure protection for the Mexican fruit fly free areas in North Mexico, inspection stations are operated at strategic locations and commercial shipments of citrus, mangoes, and other Mexican fruit fly host fruits are fumigated free of charge at Benjamin Hill, Sonora so that the fruit may be certified for entry into Northern Sonora and Baja California. Despite all precautions, contraband fruit occasionally finds its way into Baja California and to assure that any infestation of Mexican fruit fly might be detected as it occurs, McPhail traps are operated in Baja California on a year round basis. Previously, a finding of the Mexican fruit fly in this area triggered an eradication program using a malathion spray mix. While this program over the years has always resulted in the eradication of the incipient infestations found in Baja California, the operation was onerous to the public. This year, instead of using an insecticide to eradicate the Mexican fruit fly in Baja California, marked chemically sterilized Mexican fruit flies reared in the Mexico City Laboratory of the Entomology Research Division were released in Tecate, Baja California, Tijuana, Baja California and Ensenada, Baja California, after trapping revealed the Mexican fruit fly was present. Releases were begun after the finding of the first fly and sterile fly releases were made at a rate of 1,000 sterile flies to 1 native fly.

Through June, the male sterilization operation program was being carried out and there was no indication of an established Mexican fruit fly infestation in Baja California.

First liberations were begun April 23, 1964 and made weekly. At the end of the year a total of 613,926 sterilized male Mexican fruit flies had been released in Baja California.

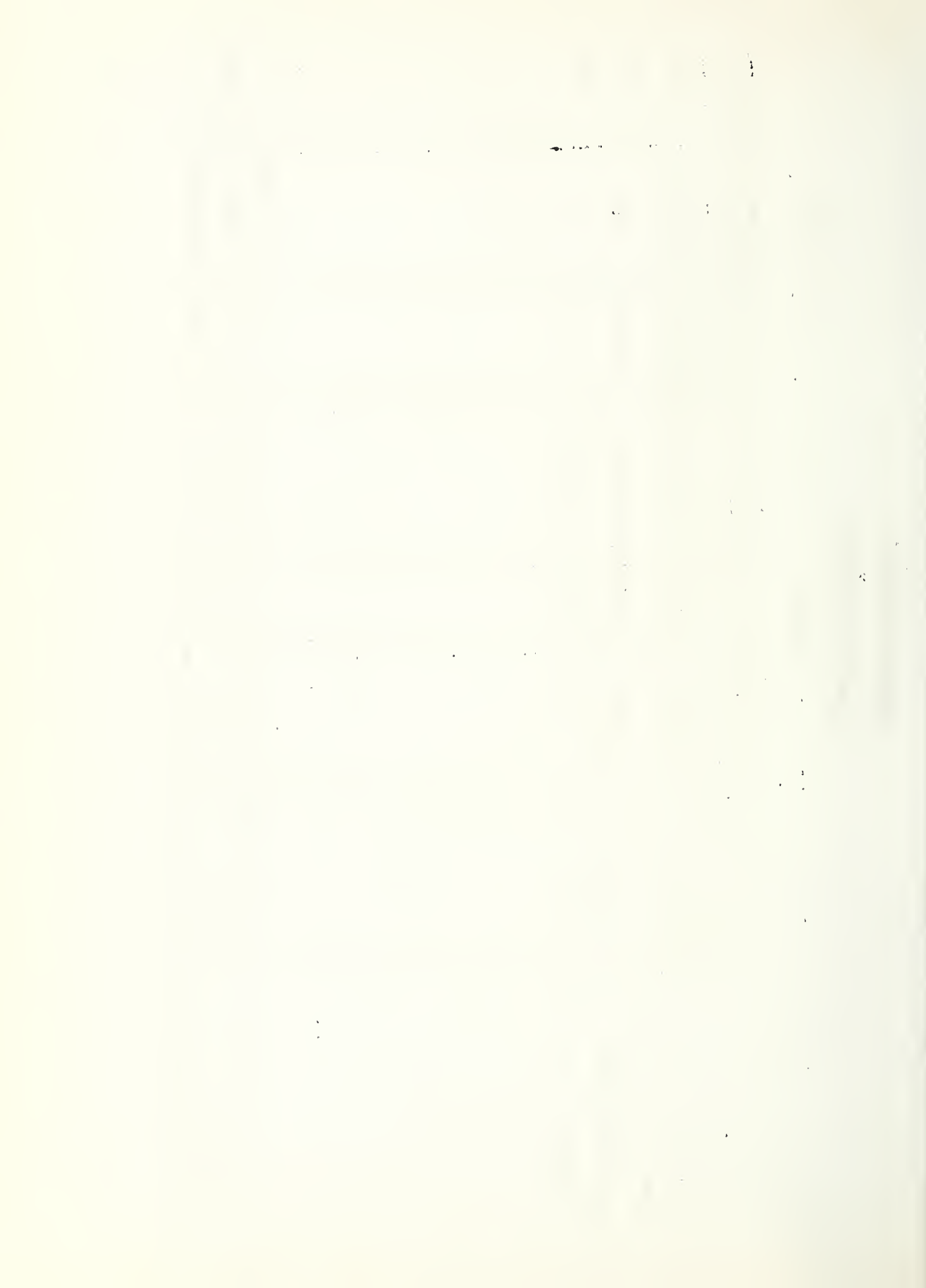
MEXICAN FRUIT FLY

SURVEY AND DETECTION

F. Y. 1964

SUMMARY

S T A T E	NUMBER PROPERTIES SURVEYED		N U M B E R O F			NUMBER INFESTED	
	Fruit Inspection	Trapped	Traps in Use	Trap Inspections	Positive Specimens	Properties	Acres
Baja California	24	1,542	1,859	76,078	133	95	31,915
Sonora	12	49	114	2,426	2	1	75
T O T A L	36	1,591	1,973	78,504	135	96	31,990



MEXICAN FRUIT FLY
REGULATORY ACTIVITY
FUMIGATION

SUMMARY

F. Y. 1964

S T A T E	F R U I T F U M I G A T E D (B O X E S)						
	Mangoes	Oranges	Sweet Limes	Plums	Guavas	Quinces	Total
Sonora Baja California	54,123	36,348	1,569	4,330	6,790	150	103,310
	1,000	-	-	-	-	-	1,000
T O T A L	55,123	36,348	1,569	4,330	6,790	150	104,310

MEXICAN FRUIT FLY

CONTROL ACCOMPLISHMENTS

SUMMARY

F. Y. 1964

S T A T E A N D M U N I C I P I O	INSECTICIDE TREATMENTS			BIOLOGICAL CONTROL STERILE MALE A. MIDDENS				
	Number Properties	Number Acres	Number Host Plants	Number Of Releases	Number Flies Released	Number Flies Recaptured	Number Acres	-
<u>Baja California</u>								
Tijuana	22,902	16,672	126,283	8	613,926	10,398	240,000	
Ensenada	4,697	3,885	38,292					
Tecate	911	650	9,529					
T O T A L	28,510	21,207	174,104	8	613,926	10,398	240,000	

MEXICAN FRUIT FLY

PARASITE LIBERATIONS

BY

SANIDAD VEGETAL

SUMMARY

F. Y. 1964

S T A T E	P A R A S I T E L I B E R A T I O N S	
	<u>Syntomosphyrum</u> <u>Indicum</u>	<u>Opius spp.</u>
Chiapas	94,380	6,410
Colima	70,540	6,000
Estado de Mexico	5,000	-
Guerrero	23,480	3,305
Jalisco	84,990	5,309
Michoacan	35,300	8,584
Morelos	40,000	4,000
Nayarit	9,000	500
Oaxaca	29,850	370
Puebla	139,940	1,850
San Luis Potosi	42,000	-
Sinaloa	3,000	-
Veracruz	15,000	-
T O T A L	529,480	36,328

MEXICAN FRUIT FLY

PARASITE EXPORTATION BY

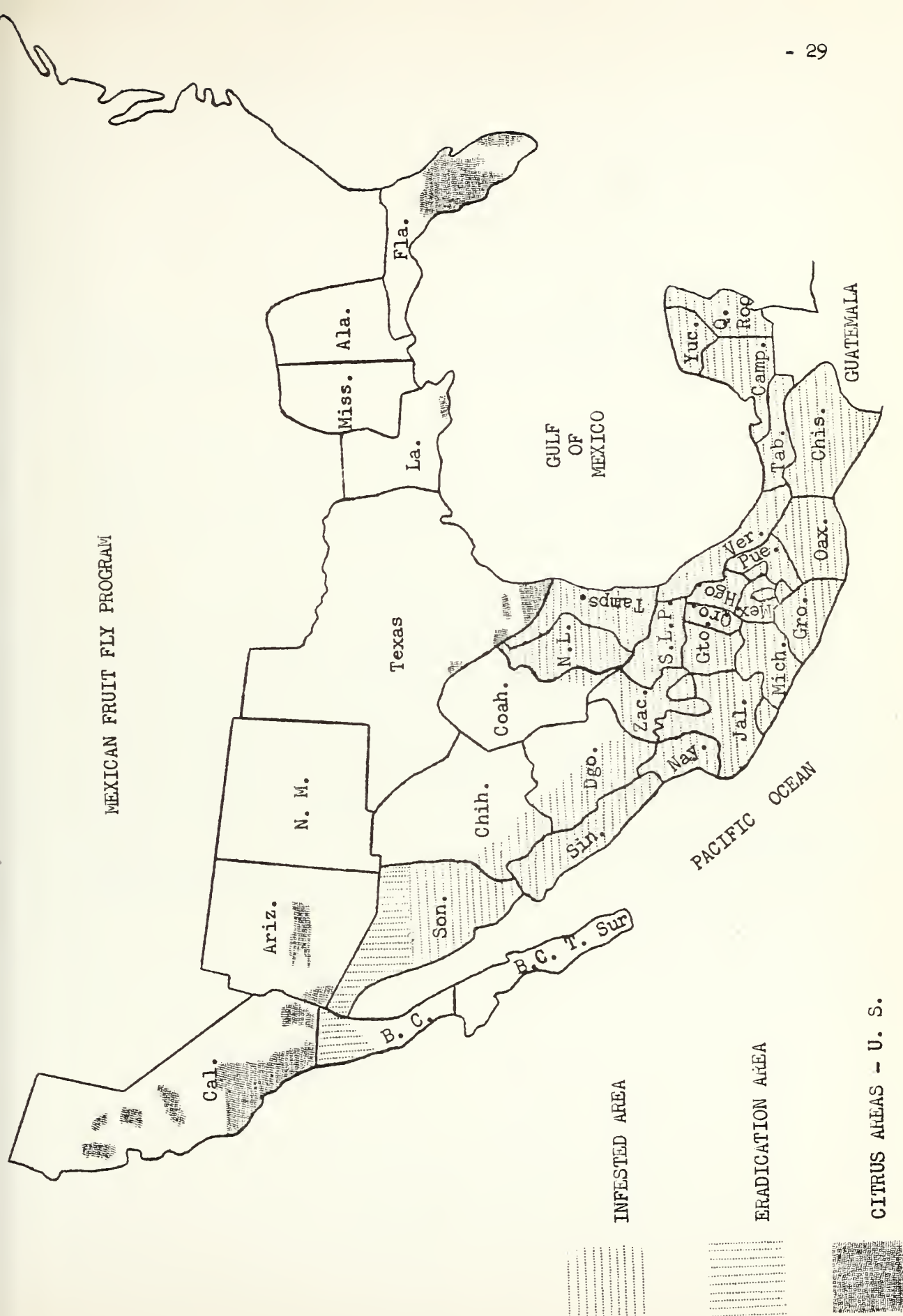
SANIDAD VEGETAL TO FOREIGN COUNTRIES

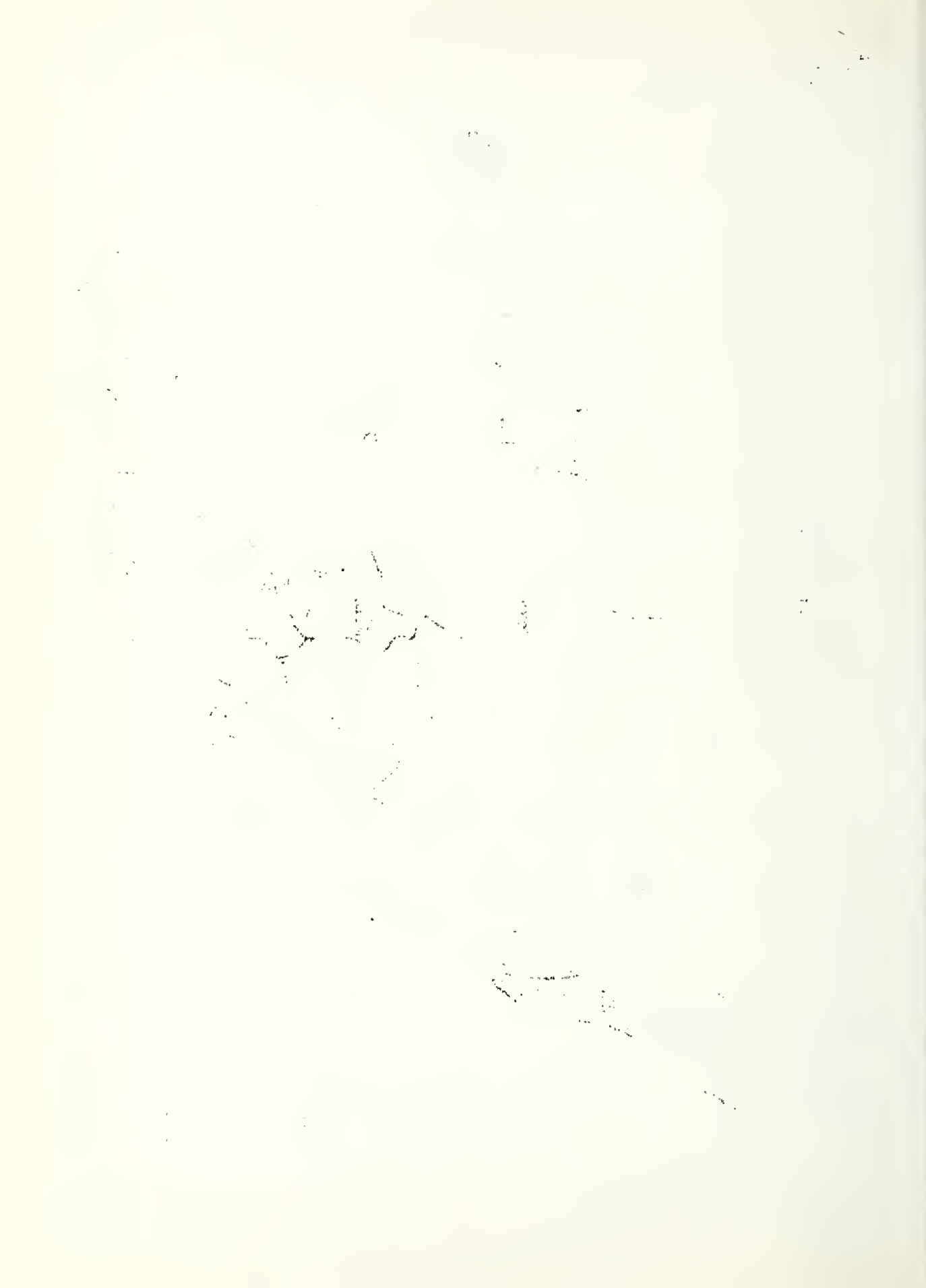
SUMMARY

F. Y. 1964

C O U N T R Y	P A R A S I T E S E X P O R T E D		T o t a l
	<u>Syntomosphyrum</u> <u>indium</u>	<u>Opius</u> spp.	
Costa Rica, Central America	271,593	16,960	288,553
Trinidad, West Indies	25,000	2,000	27,000
T O T A L	296,593	18,960	315,553

MEXICAN FRUIT FLY PROGRAM





PINK BOLLWORM

Surveys for detection were carried on in the north west Mexico States of Sinaloa, Sonora and Baja California with negative results. Detection surveys included bloom inspections, lint cleaner inspections, gin trash inspections, and light trap inspections.

In East Mexico, limited inspections for comparison with the previous years and as an aid to farmers in planning their pink bollworm control operations were made in the States of Tamaulipas, Chihuahua, Durango, Coahuila, and Chihuahua, all of which states are generally infested. In some limited areas commercial damage was fairly heavy; however, in the majority of the cotton areas the pink bollworm did not cause serious damage.

Cultural practices as a control or as a preventive measure were carried out depending on the particular situation in all cotton producing areas. In most regulated areas, seed sterilization was required as a continuous process of ginning, and where this was not a requirement, cotton seed could not leave the area without being fumigated with methyl bromide according to the standard procedure. Gin sanitation was practiced in all cotton producing areas of East and West Mexico. Cotton processing plants producing for the export of their products to the United States were certified when requirements were met. Road stations strategically located were operated to intercept pink bollworm host material from East Mexico to protect Northwest Mexico against becoming infested.

The Southern Tamaulipas cotton producing area apparently continues free of the pink bollworm.

PINK BOLLWORM
SURVEY AND DETECTION
SUMMARY

F. Y. 1964

S T A T E	Number Surveyed		Number Infested		NUMBER		I N S P E C T I O N S			NUMBER
	Properties	Acres	Properties	Acres	Traps in Use	Trap Collections	Bushels Gin Trash	Blooms	Lint Cleaner	Positive Specimens
<u>Regulated Area</u>	203	-	137	-	-	-	-	-	-	-
	130	-	130	-	-	-	-	-	-	-
	166	-	166	-	-	-	-	-	-	-
	26	-	26	-	-	-	-	-	-	-
	322	-	144	-	-	-	-	-	-	-
<u>Not Regulated</u>										
Baja California	43	2,540	0	0	15	164	5,771	281,163	3,566	0
Sonora	205	22,992	0	0	15	169	6,659	664,571	858	0
Sinaloa	206	11,690	0	0	0	0	2,520	674,477	414	0
T O T A L	1,301	37,222	623	0	30	333	14,950	1,620,211	4,838	0

PINK BOLLWORM

REGULATORY ACTIVITIES

SUMMARY

F. Y. 1964

S T A T E	NUMBER Inspection for Certification	C O M M O D I T Y		L O T		T R E A T M E N T	
		No. Fumigated		Other		Total All Treatments	
Chihuahua	416	2,729		2,242		4,971	
Coahuila	1,270	0		0		0	
Durango	1,297	0		0		0	
Nuevo Leon	153	0		0		0	
Tamaulipas	7,052	0		0		0	
Sonora	0	3,028		2,745		5,773	
Sinaloa	0	168		605		773	
T O T A L	10,188	5,925		5,592		11,517	

PINK BOLLWORM
CONTROL ACCOMPLISHMENTS
SUMMARY

F. Y. 1964

S T A T E	M E C H A N I C A L
	Number of Acres Treated
Chihuahua	150,000
Coahuila	36,323
Durango	26,345
Nuevo Leon	29,262
Tamaulipas	373,990
T O T A L	615,920

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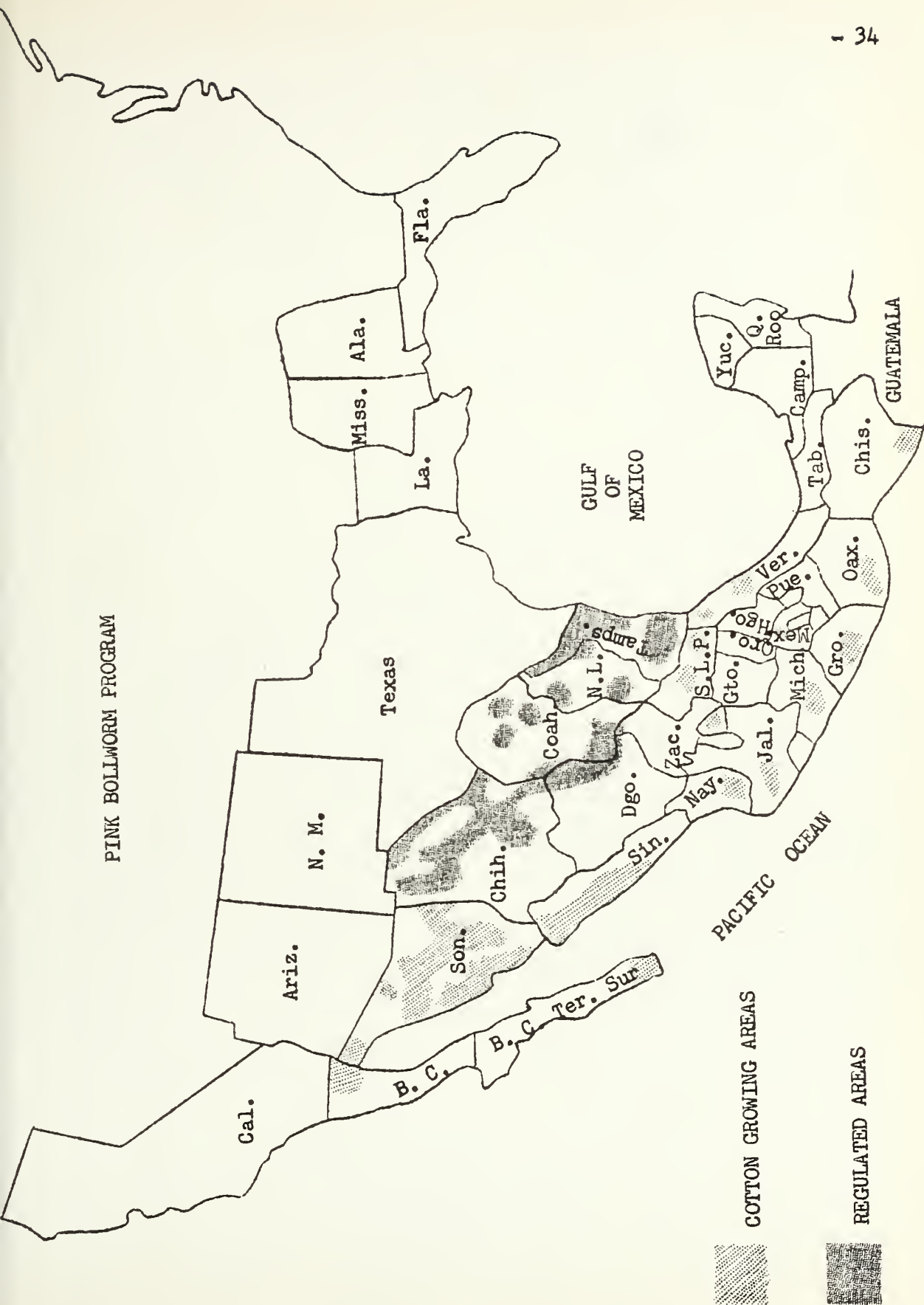
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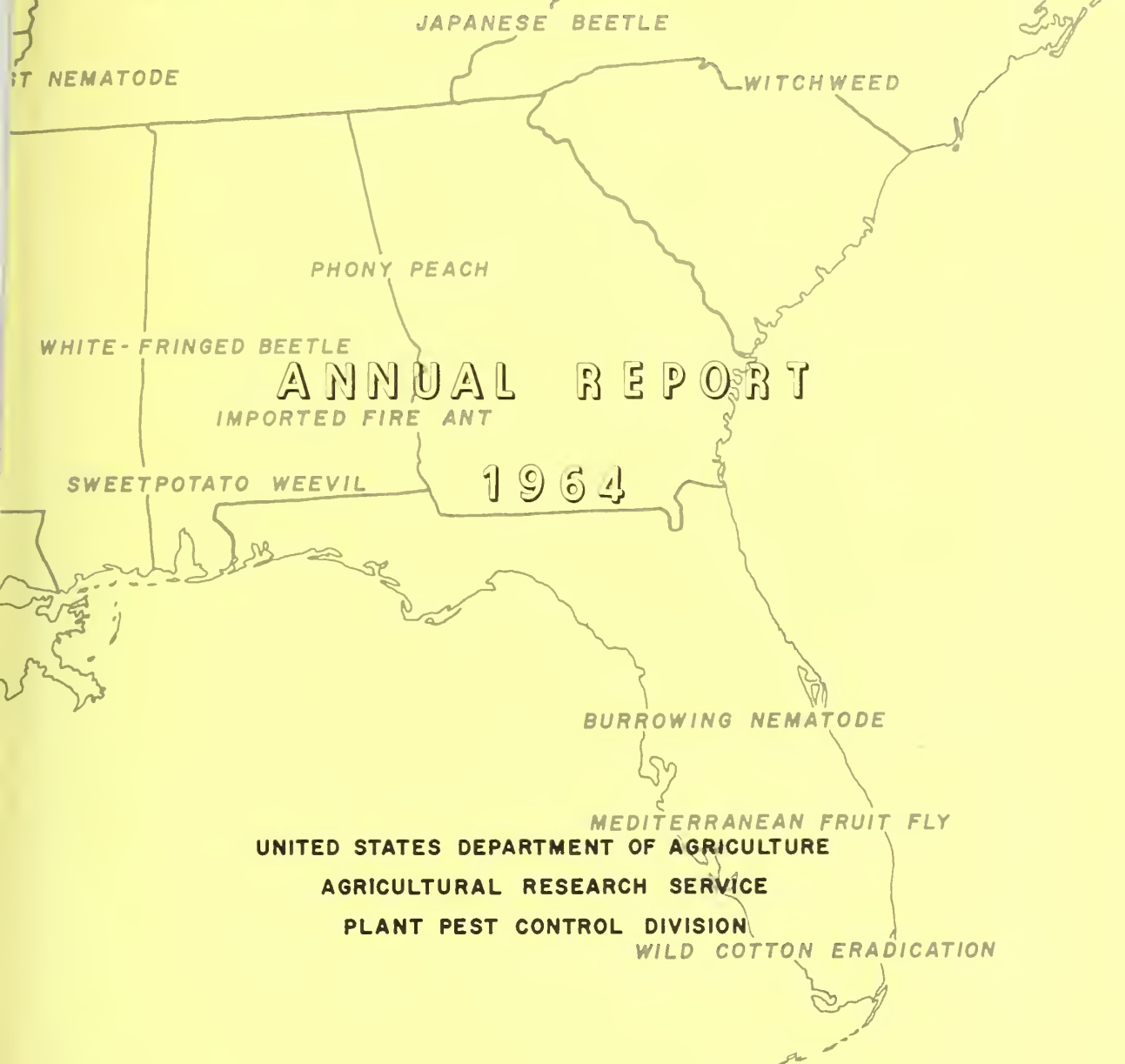
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PINK BOLLWORM PROGRAM



PLANT PEST CONTROL PROGRAMS OF THE SOUTHERN REGION



ANNUAL REPORT

1964

UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

PLANT PEST CONTROL DIVISION

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

ANNUAL REPORT
- 1964 -

SOUTHERN REGION



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IN MEMORIAM

Leland P. Hebert
PPC Technician
Rayne, Louisiana
Died September 15, 1963

John H. Day
PPC Inspector
Brownsville, Texas
Died February 8, 1964

Herbert O. Windsor
Retired August 1962
Asheville, North Carolina
Died October 1963

Robert N. Dopson, Jr.
PPC Supervisor in Charge
Baton Rouge, Louisiana
Died February 10, 1964

George G. Harris
Retired September 1963
El Paso, Texas
Died November 24, 1963

Frank C. Montgomery
PPC Technician
Opelousas, Louisiana
Died March 17, 1964

William J. Greenan
PPC Inspector
West Monroe, Louisiana
Died December 4, 1963

Walter J. Mistic
PPC District Supervisor
Opelousas, Louisiana
Died May 20, 1964

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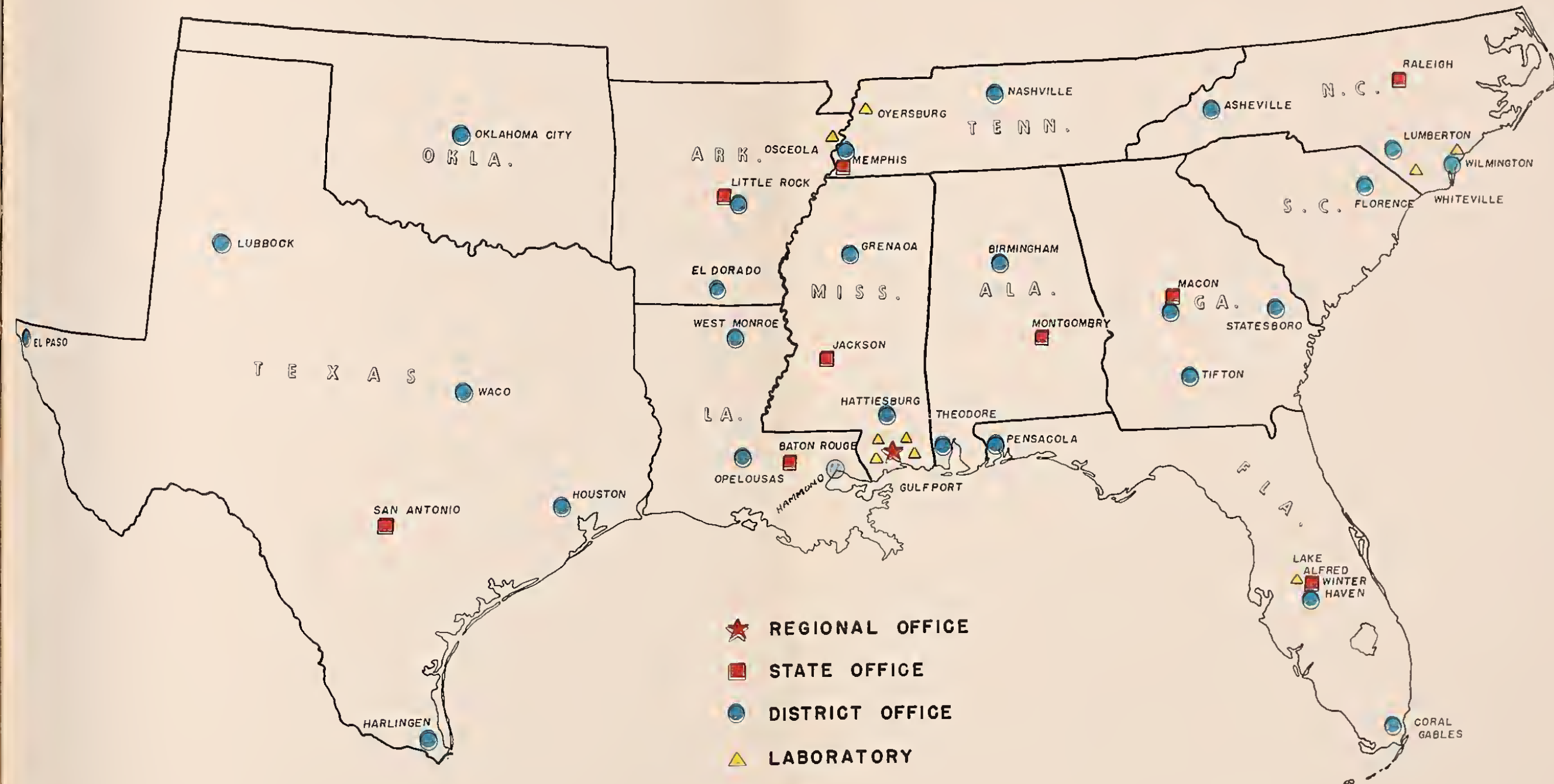
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UNITED STATES DEPARTMENT OF AGRICULTURE
 AGRICULTURAL RESEARCH SERVICE - PLANT PEST CONTROL DIVISION
 SOUTHERN REGION



ASSOCIATED ACTIVITIES

Educational work plays a most important part in all PPC programs each year. In treating cities and towns for the imported fire ant and the white-fringed beetle, the value of educational and news media is more and more evidenced, not only in effectively informing the public of our work but also in influencing the attitudes of the people toward our work and our employees. Flier leaflets and illustrated talks play a big part in programs in rural areas, and posters tell the plant pest control story wherever they are used.

As the Boll Weevil Program in southwest Texas is conducted in sparsely settled sections of the Big Bend district, where Spanish is the principal language, a unique method was used the past two years to inform the people of the plane treatments. The area is almost inaccessible to automotive equipment; therefore, a Department airplane, equipped with a loud speaker, preceded the spray plane, and an announcer advised the residents, in English and in Spanish, of the treatment plans and the precautions to be taken. That the program was completed without incident was due largely to the effective public relations activities that preceded the work and to the system of notification.

In the Carolinas special efforts were expended to familiarize the farmers with all phases of the Witchweed Program, and during the year, more than 300 meetings were held for this purpose. This effort to teach the farmers how to survey their own fields and to recognize the pest was well worth while, as a number of them have since reported the presence of witchweed on their own properties.

Bulletins, circulars, and other informational material with reference to Plant Pest Control programs were in demand, and more than 75,000 bulletins and 16,000 circulars were used in the Southern Region. Plant Pest Control representatives discussed our programs at more than 1200 meetings and made some 58 television appearances.

In addition to the efforts directed toward public information on each of the programs, much emphasis was given to pesticide safety among Division personnel. Staff visits were made to every State engaged in control, or planning control programs, to determine the adequacy of safety planning. In many instances, these visits were repeated while control operations were under way to determine the degree of compliance with earlier safety planning. Every supervisor at the lowest level was furnished copies of checklists to enable him to analyze the operation and eliminate any unsafe practices. Visits by Regional staff members were made to outside agencies to explain Division programs. These agencies included Food and Drug Administration, Fish and Wildlife Service, and Public Health Service, in addition to several Department of Defense installations.



Plane with loud speaker, used in Boll Weevil Program to advise residents of the area, in both English and Spanish, of treatment plans and the precautions to be taken.



Witchweed Training School.

Table 1.--Summary of Associated Activities, by Program, Fiscal Year 1964

Program	Public meetings attended	Presentations				Feature and news stories	Extent these aids were used					Man hrs. of technical assistance
		Talks	Slides	Films	Radio	TV	Exhibits	Bulletins	Circulars	Infestation maps and posters	Special reports	
Boll Weevil	8	...	...	...	...	...	...	...	...	...	...	18
Burrowing Nematode	...	2	...	...	...	...	...	307	2,334	...	1	189
Cereal Leaf Beetle	10	25	4	...	...	...	...	349	293	9	60	15
Citrus Black Fly	...	1	1	...	...	...	...	...	...	...	...	...
European Chafer	14	...	14	...	...	...	...	5	...	...	...	...
Gypsy Moth	2	1	1	...	...	...	...	39	...	...	...	...
Hoja Blanca	...	...	...	1	...	...	...	1	1	...	...	6
Imported Fire Ant	356	430	495	148	32	27	112	6,424	6,163	694	28	955
Insect Detection	4	3	3	...	...	...	1	252	282	89	...	83
Japanese Beetle	93	113	130	4	...	...	5	9,895	838	460	6	35
Khapra Beetle	16	4	17	...	...	...	...	235	110	...	15	42
Mediterranean Fruit Fly	...	...	1	...	...	2	...	2	73	...	...	108
Mexican Fruit Fly	...	1	1	...	1	1	...	...	98	...	...	366
Peach Mosaic	...	...	...	...	...	...	...	14	...	...	...	20
Phony Peach	3	1	1	...	1	...	...	2	48	...	...	75
Pink Bollworm	38	29	19	4	6	...	...	1,642	412	153	2,091	8,147
Soybean Cyst Nematode	29	23	117	2	...	...	...	2,234	1,426	216	...	75
Sweetpotato Weevil	2	7	6	...	2	1	...	304	148	65	...	229
White-Fringed Beetle	154	210	289	7	9	1	20	12,417	1,917	54	36	498
Wild Cotton	...	...	...	...	...	...	...	...	75	...	...	150
Witchweed	313	367	437	347	11	26	58	41,726	2,541	80	29	137
Total	1,042	1,217	1,536	513	62	58	196	75,848	16,759	1,820	2,266	11,148

Table 2.--Summary of Associated Activities, by State, Fiscal Year 1964

State	Public meetings attended	Presentations					Feature and news stories	Extent these aids were used					Special reports	Man hrs. of technical assistance
		Talks	Slides	Films	Radio	TV		Exhibits	Bulletins	Circulars	Infestation maps and posters			
Alabama	21	79	66	18	...	1	7	1	377	484	1	...	...	15
Arkansas	...	...	...	1	13	1	11	...	1,884	869	120	...	...	...
Florida	8	9	5	...	...	2	...	...	374	2,964	38	1	669	669
Georgia	54	29	24	2	5	22	40	2	1,611	912	331	...	...	695
Louisiana	34	25	5	3	20	1	11	6	71	3,386	8	1	593	593
Mississippi	14	12	1	19	...	...	5	2	1,278	180	188	...	...	128
N. Carolina	710	689	1,064	358	11	25	8	173	61,583	2,695	735	78	166	166
Oklahoma	...	7	...	...	...	...	...	...	...	...	...	...	...	...
S. Carolina	137	330	315	96	7	5	8	6	2,860	985	48	2	14	14
Tennessee	6	8	3	4	2	...	3	6	3,857	3,851	126	64	285	285
Texas	58	29	53	12	4	1	103	...	1,953	433	225	2,120	8,583	8,583
Total	1,042	1,217	1,536	513	62	58	196	196	75,848	16,759	1,820	2,266	11,148	11,148

BARBERRY ERADICATION

The fungus Puccinia graminis, which causes black stem rust of wheat and other grains, spends a portion of its life cycle on the leaves of some species of barberry and mahonia plants. The purpose of the Barberry Eradication Program is the removal of these alternate hosts of the fungus, thus breaking the life cycle and preventing damage to commercial grain plantings.

In the Southern Region, this is entirely a regulatory program and consists of the inspection of nurseries and sales yards to make certain that only rust-resistant varieties of barberry or mahonia are grown or handled. This assures that no stock capable of spreading black stem rust will be shipped into a State where eradication work is in progress.

The following table shows the results of the nursery inspection for the 1964 season.

Table 3.—Barberry Program, Regulatory Activities, Fiscal Year 1964

STATE	Properties	Inspection for Certification	
		Nursery (acres)	Dealers
Alabama	29	5,671	1
Arkansas	2	200	...
Florida	3	610	...
Georgia	24	1,098	...
Louisiana	14	1,454	1
Mississippi	5	585	...
North Carolina	6	567	...
Oklahoma	17	2,462	...
South Carolina	4	620	...
Tennessee	30	7,367	6
Texas	10	1,890	2
Total	144	22,524	10

BOLL WEEVIL

During this fiscal year, emphasis was placed on boll weevil hibernation surveys to determine the presence and number of overwintering weevils and thereby establish an index of expected infestation in the 1964 cotton crop. Special hibernation cage studies were conducted in the Texas High Plains area to determine whether or not the boll weevil could overwinter above the Caprock; results were positive.

In the Texas Big Bend area, the boll weevil was first found in 1953. Each year it increased in numbers, with a resulting increase in damage to cotton. In 1960, surveys indicated that the weevil had migrated, also, as far west as the El Paso Valley and thus posed a threat to the cotton-producing areas of New Mexico, Arizona, and California. As a result, a cooperative control program was initiated to prevent further westward movement. This program has continued successfully for three consecutive years, and no boll weevils have been found west of El Paso, Texas. Agencies cooperating in these efforts are the National Cotton Council, Texas Department of Agriculture, Texas Agricultural Experiment Station, Mexico Department of Agriculture, and the Entomology Research and Plant Pest Control Divisions.

Survey in the Big Bend area of Texas was under way at the beginning of the fiscal year, but no weevils were found on the American side of the Rio Grande River until August 8, 1963, when a field in the Ruidosa section was found infested. The westernmost weevil infestation in the Big Bend area was found on the Bennett farm on September 25.

As a result of these surveys, the 1963 control program included an area 125 miles long on both sides of the Rio Grande River between Ruidosa and Esperanza, Texas. As in previous years, methyl parathion was applied with aircraft. Treatments began September 23 and were completed on November 20.

In order to determine the extent of overwintering hibernation following the 1963 control program, a survey was made along the Rio Grande. This mid-winter survey resulted in finding two fields infested south of the treatment area; one was in Mexico and the other within the old treatment area.

Survey in the 1964 crop got under way May 18. The first infestation was found near Presidio, south of the treated area, on May 18; but at Ruidosa, inside the treated area, weevils were not found until June 16. In the Candelaria section, weevils were found this year on June 22; whereas in the 1963 crop, infestations were not found until August.

In the El Paso section, survey began July 1, 1963. Ten properties were found infested between September 23 and October 29. To eradicate this infestation, all infested fields were treated with Sevin until frost. As these fields were near thickly populated residential areas, all applications were made with ground equipment. This was the fourth consecutive year that the boll weevil has been found late in the season in the El Paso Valley.

In the High Plains area of Texas, a detailed survey was made in the late summer and fall of 1963. This survey showed the western limits of the boll weevil infestation to be above and below the Caprock in seven West Texas counties.

To resolve the question of whether or not the weevil overwinters above the Caprock, the Division assisted other cooperating agencies in the late fall with the installation and stocking of weevil hibernation cages. By the end of June 1964, weevils had emerged in some cages both above and below the Caprock. This study was complemented by examination of surface debris, which also verified the presence of overwintering weevils above the Caprock. One boll weevil was taken above the Caprock in volunteer cotton.

Several meetings with the Plains Cotton Growers Association in West Texas generated much interest in a control program similar to the one along the Rio Grande border but with the Association paying one-half the cost.



Collecting trash and debris in boll weevil hibernation survey.

Table 4.--Boll Weevil Program, Survey and Control Activities, Fiscal Year 1964

State	Survey and detection			Control			
	Surveyed	Found infested		Properties	Insecticide treatment		
	Properties	Properties	Acres		Ground	Air	Total
Texas	1,837	69	1,876	135	2,624	6,261	8,885
Total	1,837	69	1,876	135	2,624	6,261	8,885

CITRUS BLACKFLY

Since citrus blackfly has not been found in Texas since the eradication program of 1956, the only activity associated with the program during fiscal year 1964 was survey. Following the freeze of 1962, when many of the groves were completely killed and many of the trees were destroyed in the surviving groves, it has been possible to inspect a greater percent of the existing host plants.

Because there would be stages of the pest throughout the year if an infestation were present, it is possible to do inspection work in each month of the year. In fiscal year 1964, personnel of the Texas Department of Agriculture again joined Plant Pest Control Division inspectors in making the annual survey of the citrus area. Special attention was given to all properties and environs where infestations were present in 1955-56.

Other locations carefully checked included villages, towns, and cities along the Rio Grande River and the Valley from Brownsville, Cameron County, Texas, to Eagle Pass, Maverick County, Texas. Citrus plantings along roads and highways leading to and from the infested areas in Mexico were checked as in previous years. Inspections were made, also, in commercial citrus groves throughout the citrus-producing sections of the lower Rio Grande Valley and the Winter Garden area of south Texas.

There was a substantial increase in the number of hosts inspected this year over the number inspected in 1963. During fiscal year 1964, there were 87,837 trees inspected on 3,390 properties; while only 70,465 trees were included in the 1963 survey program. The program in 1964 included the inspection of host plants in the following 13 counties: Bee, Brooks, Cameron, Dimmit, Duval, Hidalgo, Jim Hogg, Maverick, Starr, Webb, Willacy, Zapata, and Zavala.

During the latter part of June, a Louisiana nursery inspector found specimens suspected of being blackfly in the Metairie area of Jefferson Parish, Louisiana. As a result of this find, an intensive inspection was made of Perino's Nursery Sales Yard, which is near the location of the find. Additional suspicious specimens were found in this nursery, but fortunately they were identified as not citrus blackfly.

MEDITERRANEAN FRUIT FLY

At the beginning of fiscal year 1964, the Mediterranean Fruit Fly Program was active in Florida and the fourth eradication campaign was under way. By June 17, 1963, one female and two male Mediterranean fruit flies had been trapped at 1461 N. W. 37th Avenue, Miami, Florida. From the date of the first finds to August 28, 1963, the date of the last find, Mediterranean fruit flies were discovered at 16 locations in Greater Miami. At three locations, larval finds were made, all during the month of June. Single males were trapped at seven locations and single females at four locations. At only two locations were both males and females taken, and not more than three flies were taken from any trap. All quarantine restrictions were lifted on November 26, 1963, and the Mediterranean fruit fly was considered eradicated from Florida for the fourth time in less than 35 years.

The cost of the third eradication program in 1962-63 (which had been confined to 3 counties, compared to 28 in the 1956-57 campaign) was approximately one-tenth that of the 1956-57 effort. The cost of the fourth eradication, carried out mostly during fiscal year 1964, was only one-tenth that of the third eradication, and the infestation was confined to Miami, in Dade County. With the exception of two small areas, one in Miami Springs and the other in Miami Shores, all areas sprayed were contiguous. The value of early detection, so plainly demonstrated by the third eradication, was even more vividly manifested by the results of the fourth eradication.

On May 20, 1964, a male Mediterranean fruit fly was found in a Steiner trap at Pier #2, Biscayne Boulevard, Miami, Florida. The fly was tentatively identified as Ceratitis capitata by Mr. Alfred S. Mills, taxonomist with Plant Quarantine in Miami. It was then forwarded to Gainesville, Florida, by Trailways bus, and the Entomology Department was notified by telephone. The identification was confirmed on May 21 by Mr. H. A. Denmark, Entomologist in Charge, Florida Department of Agriculture. In addition, this fly was examined by Mr. Kamasaki, of the USDA Hawaii Fruit Fly Investigations Laboratory, Honolulu. He reported that this was an immature fly, approximately one to three days old, assuming a temperature of 80° F. No quarantine or control measures were undertaken, as it appeared obvious that the fly was a hitchhiker and that no active infestation was established. An investigation revealed that a ship which left Hawaii on May 5 arrived at Pier #2 in Miami on May 18 and left on May 19. The male Mediterranean fruit fly was found on May 20 in a Steiner trap which was hung in a nonhost tree between Pier #1 and Pier #2. All evidence indicated that the fly emerged on the ship and was trapped soon after leaving the ship.

Traps were increased to 100 per square mile in an area of 4 square miles around the spot where the fly was found. These traps were inspected daily, except Sunday, for a period of two weeks, then put on a biweekly schedule. Traps in a 45-square-mile area were increased to 60 per square mile and checked biweekly for four weeks. All traps were put on a weekly schedule on June 17, which was four weeks after the fly was found. All other traps in Dade County were maintained on a 10-day schedule. At the close of fiscal year 1964, no additional Mediterranean fruit flies had been found.

Trapping operations were continued throughout the 1964 fiscal year in the coastal areas of Louisiana, Mississippi, and Texas.

Table 5.--Mediterranean Fruit Fly Program, Survey and Control Activities, Fiscal Year 1964

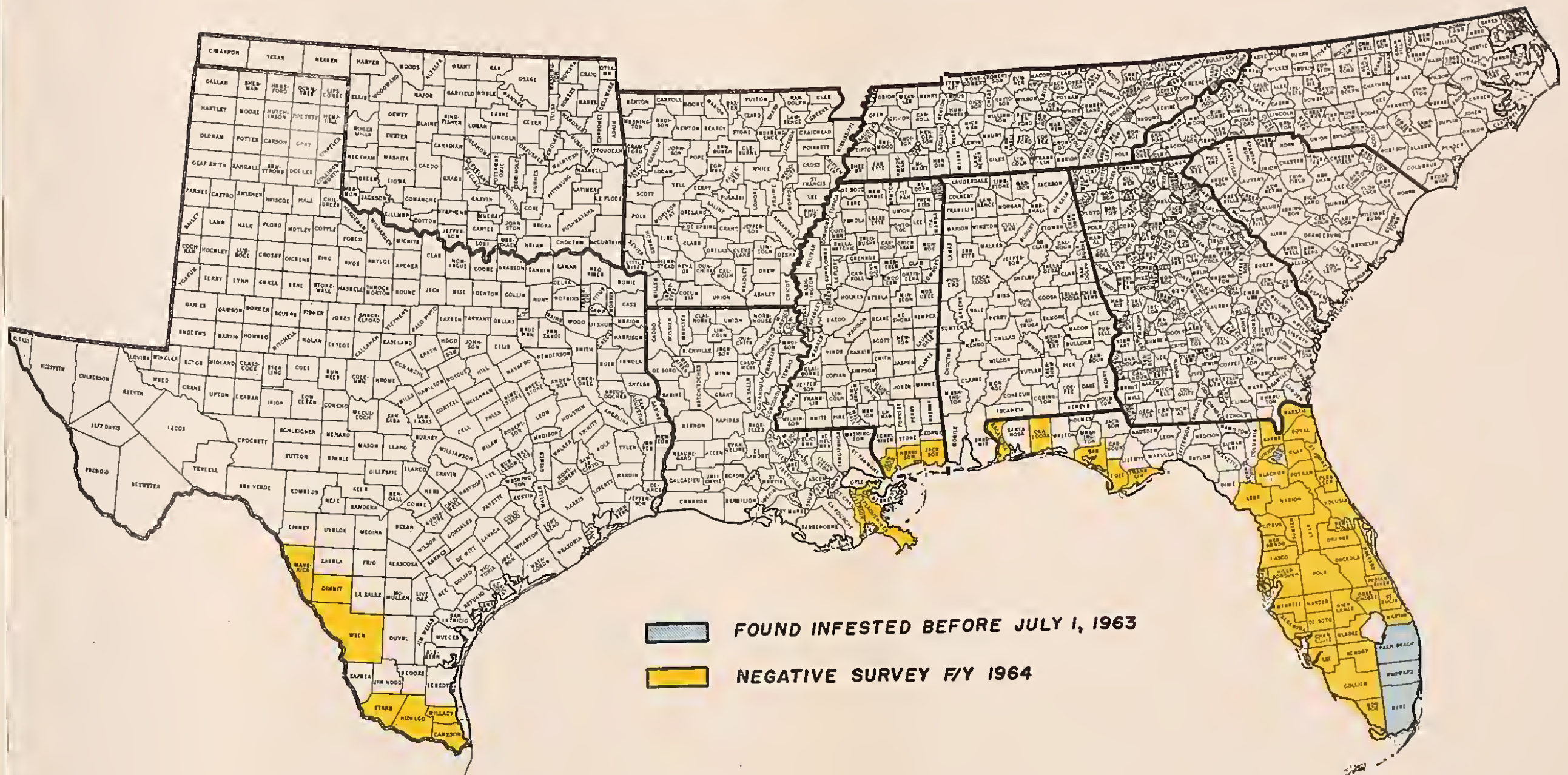
State	Survey and detection				Control		
	Locations trapped	Positive specimens	Found infested		Acres treated with insecticide		Total
			Properties	Acres	Ground	Air	
Florida	29,052	70	16	7,500	843	68,630	69,473
Louisiana	53	...	...	...	...	...	...
Mississippi	22	...	...	...	...	...	...
Texas	217	...	...	...	...	...	...
Total	29,344	70	16	7,500	843	68,630	69,473

Table 6.--Mediterranean Fruit Fly Program, Regulatory Activities, Fiscal Year 1964

State	Regulatory						
	Inspection for certification				Acres treated for certification purposes (soil)		
	Properties	Nursery (acres)	Processing plant visits	Shipping point visits	Other	Commodity lots treated	
Florida	1,093	230	969	30	362	461	461
Total	1,093	230	969	30	362	461	461

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE - PLANT PEST CONTROL DIVISION
SOUTHERN REGION

MEDITERRANEAN FRUIT FLY



MEXICAN FRUIT FLY

The Mexican Fruit Fly Program is one of the oldest in the Plant Pest Control Division. It has been in effect nearly 40 years. For many years, the campaign against the Mexican fruit fly was conducted on an eradication basis. Later, when it was determined that this insect migrated from its native home in northeast Mexico, the program switched to survey and regulatory measures designed to prevent the spread of this insect to other fruit-growing areas within the United States. The program has been so successful that no infestations have ever become established outside the present nine-county regulated area in southern Texas.

Surveys are made with the use of traps. Regulatory activities include the supervision of fumigations with ethylene dibromide and the issuance of certificates before shipment into noninfested areas. During fiscal year 1964, traps were operated from the opening of the harvesting and shipping season until the end of the year. Counties trapped were Brooks, Cameron, Dimmit, Duval, Hidalgo, Starr, Webb, and Willacy. The 1963-64 citrus season officially opened on September 16, 1963, at which time the maximum number of 2100 traps was in use. Beginning December 1, 1963, the number of traps was reduced by half. After that date, all citrus consigned to the major citrus-producing States was fumigated; hence traps were no longer a basis of certification. From the opening of the season until December 1 each year, citrus fruits are allowed movement to the other major citrus-producing States without treatment, provided no Mexican fruit flies have been caught in the trapping operations.

The first positive specimen trapped this fiscal year was taken in Starr County on November 12, 1963, three weeks earlier than in fiscal year 1963. The total catch for the 1964 trapping season was 157 in five counties, as follows: Cameron 1, Dimmit 1, Hidalgo 124, Starr 26, and Webb 5. Fifty-nine of the flies trapped in Hidalgo County came from a backyard planting in McAllen, where 30 infested grapefruit were found in mid-April. The lure used was ENT-44,014X, enzymatic hydrolysate of cottonseed plus borax. This new lure is very effective. Five larval infestations were found this year. The first larvae of the season were found on April 15, 1964. All larval infestations were on city lots in Hidalgo County.

Regulatory activities increased over last year because of the rapid comeback in fruit production following the 1962 freeze. The 1963-64 citrus crop in Texas amounted to 662,000 boxes, about three times more than the crop for the previous year. One hundred and seven fumigations were supervised in the treatment of 31,812 boxes of grapefruit and oranges. By April 15 all commercial citrus had been harvested. There was a decided increase, also, in importation of Mexican citrus over the previous season. Much of this fruit was handled under Federal Quarantine 64 upon arrival at the various citrus-packing plants in the Rio Grande Valley.

A new development this year was the permanent change of the date from March 1 to April 1 in the requirement to fumigate grapefruit shipped to Southern States. This change in the Quarantine was well received by the citrus industry of Texas.

The Division cooperated with Entomology Research, Mexico City, in a sterile fly program conducted in the Rio Grande Valley of Texas this year. Plant Pest Control personnel operated the traps necessary for the program, identified marked flies captured, and kept records needed to evaluate results obtained. The Texas State Department of Agriculture, also, cooperated in the program and furnished help to operate traps.

The sterile fly program included the liberation, in citrus groves in Hidalgo County, of Mexican fruit flies that had been reared, sterilized, and marked in the laboratory in Mexico City. The first release was made February 6-8, 1964, and consisted of 9,870 equally sexed Mexican fruit flies. These were released in 10 groves as follows: in 5 groves, 10 chemosterilized and 10 irradiated flies per acre; and in 5 other groves, 100 chemosterilized and 100 irradiated flies per acre. Twenty traps, baited with ENT-44,014X, were placed in each property and inspected and serviced at weekly intervals. Traps were in use, also, over the four Rio Grande Valley counties, as well as the other citrus-producing counties of Brooks to the north and Dimmit and Webb to the northwest. Marked flies began showing up in traps on the first round of inspection and continued until the week ending March 20, after which date no marked flies of the first release were trapped. Captured sterile flies amounted to a fraction more than 3 percent of the total released in the first operation. Only three were taken outside the groves where the releases were made. Two were trapped 7/10 mile and one 4 miles from release points. These captures occurred during the trap week of March 9-16.

In a second operation the same number of sterile and marked flies were released on April 15, 1964, in the same groves. Captures from this second release totaled slightly more than 12 percent. Only one specimen was trapped outside release points. It was found during the week ending June 12 in a grove 1 3/4 miles from the point where it was released on April 15. The final report on the sterile fly release program will be made by Entomology Research.

In early December a Mexican fruit fly larva was found in fruit from Mexico on board a ship at Bradenton, Florida. As a result, intensive trapping was conducted in the Tampa-Bradenton area from early December 1963 until late April 1964. Some 878 locations were trapped in 9 counties in Florida during the fiscal year.



Filling glass trap with liquid lure.



Examining trap for proper amount of bait.



Mexican fruit fly trap installed in citrus tree.



Trapped insects are spread on screen for quick observation.

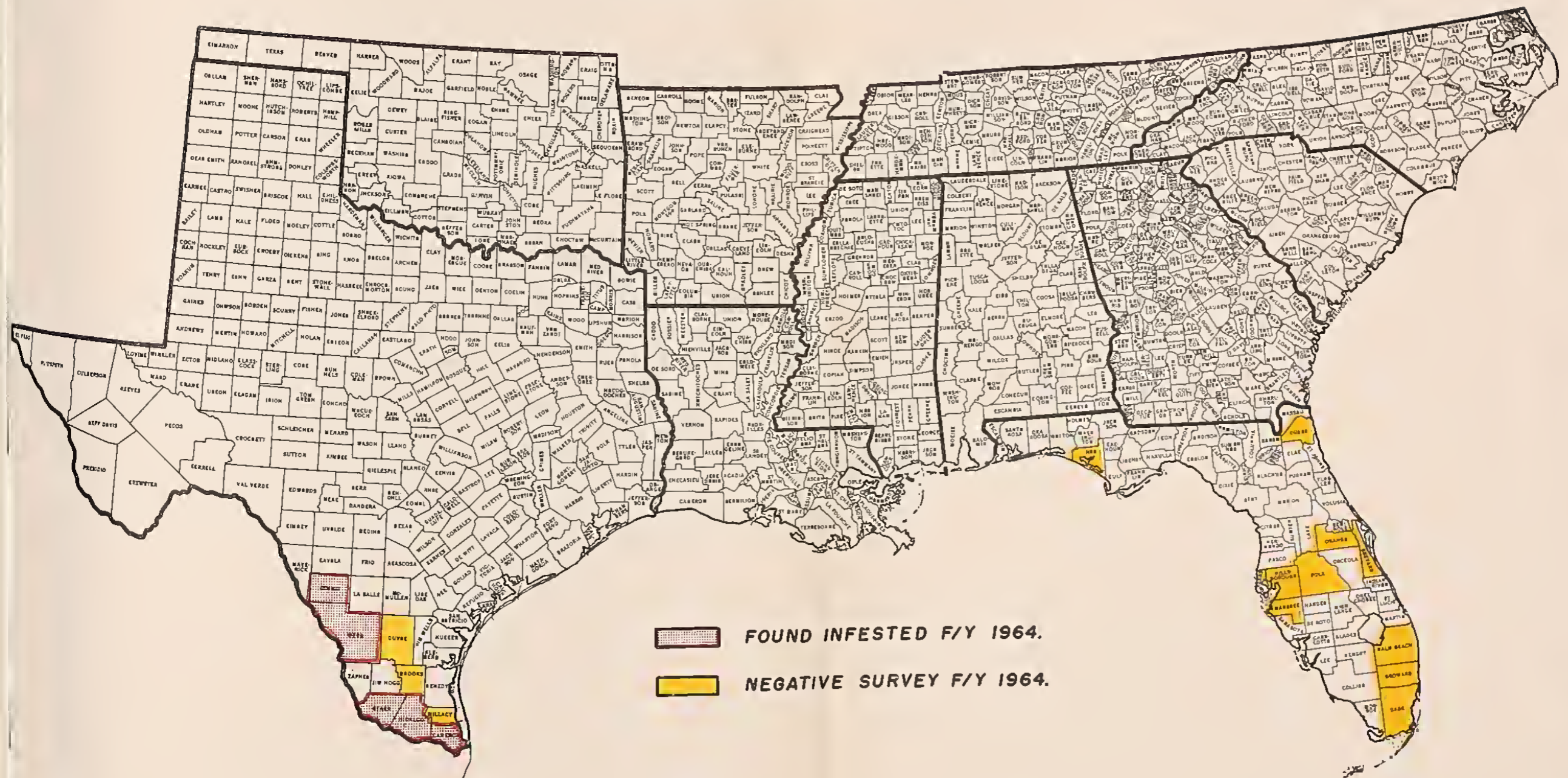
Table 7.--Mexican Fruit Fly Program, Survey and Regulatory Activities, Fiscal Year 1964

State	Survey and detection				Regulatory							Commodity lots fumigated
	Surveyed			Found infested		Inspection for certification				Other		
	Properties	Locations trapped	Positive specimens	Properties	Acres	Properties	Acres		Processing plant visits			
							Nurs.	Other				
Florida	387	878	...	...	...	...	...	...	...	...	...
Texas	54	1,237	162	38	468	161	...	17,827	887	85	106	
Total	441	2,115	162	38	468	161	...	17,827	887	85	106	



UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE - PLANT PEST CONTROL DIVISION
SOUTHERN REGION

MEXICAN FRUIT FLY



COOPERATIVE ECONOMIC INSECT SURVEY AND DETECTION

The Cooperative Economic Insect Survey and Detection Program was conducted throughout the year, with full-time survey entomologists employed under agreements in Alabama, Arkansas, Florida, Georgia, North Carolina, Oklahoma, and Texas. Frequent reports were received from the remaining four States during seasons of greatest insect activity. Only two personnel changes occurred during the fiscal year. In Texas, Mr. M. V. Meisch succeeded Mr. W. H. Newton, and in Florida, Mr. Frank W. Mead succeeded Mr. F. W. Woodruff, who is resuming graduate work. Fortunately, Mr. Newton remained available for assistance, as he became Extension Entomologist. The chief cooperation in Georgia now is from the State Department of Agriculture rather than the University; however, Mr. W. C. Johnson is continuing as survey entomologist.

During the year, 5,602 insect collections were received at Gulfport from all States in the Region as a result of the survey work. These were mostly program pests; and in 3,467 cases, the field men had correctly identified the specimens at the time they were submitted.

Nineteen species of insects, new to the reporting States, were found, eight of which were in Florida and the remainder in Alabama, Arkansas, Oklahoma, South Carolina, and Tennessee. One species new to the United States was found in Florida during the year.

After a lapse of several years, boll weevil hibernation survey was resumed in Alabama under the direction of Mr. H. Frank McQueen, with some assistance from Plant Pest Control personnel. This work probably will be expanded during the coming fiscal year, particularly with the increased interest in boll weevil control throughout the Region.

The finding of tolyposporium smut in Georgia aroused some interest. During the latter part of July, two inspectors were sent from the pearl millet seed-producing areas of Texas to observe survey for this disease in the Tifton, Georgia, area. Subsequently, surveys were initiated in south Texas and in the Lubbock area where considerable acreage of pearl millet was planted. One of these inspectors later assisted in similar surveys in the Western Region. The survey conditions in south Texas were not good, as most of the crop had matured and a great deal of it had been harvested. However, survey conditions in the Lubbock area were good, as the crop was not as far advanced as in the southern portion of the State. In the Lubbock District, approximately 6,000 acres were inspected in 15 counties. In the Harlingen District, approximately 2,207 acres were inspected in 6 counties. All survey in Texas to date has been negative. The importance of this disease has not been fully determined, but it would not appear to be of any consequence when millet is being produced for forage.

Division personnel were able to render some assistance incidental to their regular duties in corn borer survey in Tennessee. This work fits in well with witchweed survey. Specimens were found in a few counties not previously known to be infested.

Beet Leafhopper and Potato Psyllid (Texas and New Mexico)

The beet leafhopper and potato psyllid survey in Texas and New Mexico, made annually to determine abundance and development of pest and host, began February 26, 1964, and continued through April 3, 1964. Due to unusually late leafing out of the host plant Lycium, potato psyllid surveys were not completed until April 3, although the beet leafhopper survey was completed March 10, 1964.

Beet leafhopper numbers again rose slightly in Texas. In general, the 1964 survey indicated that host plants were in poorer condition and more sparse, and that beet leafhopper counts were slightly higher than in 1963. This year only 66 percent of the sites examined contained hosts and only 34 percent had leafhopper infestations. In the 3,050 square feet sampled, 344 beet leafhoppers were found. This is an average of 11 hoppers per hundred square feet, as compared to 8.6 per hundred square feet found in 1963.

New Mexico beet leafhopper numbers rose substantially this year. Distribution was extremely spotted as leafhoppers were found at only five sites. There were 162 beet leafhoppers found in the 500 square feet sampled. This is an average of 32 beet leafhoppers per hundred square feet, as compared to 6.7 per hundred square feet found in 1963.

Potato psyllid sampling in the Big Spring and San Angelo, Texas, areas was deferred once because of delayed leafing of Lycium. However, several trips were required to the El Paso, Texas, and Las Cruces, New Mexico, areas as plants at these locations did not leaf out until the end of March. Heavy potato psyllid populations were found in the Big Spring, San Angelo, and Del Rio areas. Egg deposits, also, were heavy in these areas and were present at all but five sites surveyed.

Cereal Leaf Beetle

Activities on the Cereal Leaf Beetle Program during fiscal year 1964 again were confined entirely to survey, since no infestation is known to exist in the Region. Limited detection surveys were conducted throughout the Region in conjunction with, or incidental to, other program work. Particular attention was given to the areas of heaviest small grain and corn production. Sweep nets were used extensively in this work, but observations for feeding signs also were utilized to detect the presence of this destructive feeder. No cereal leaf beetles were found.

Nearly 4,000 properties were examined in the Carolinas in conjunction with witchweed survey.

In Oklahoma and Texas, a general detection-type survey was made in conjunction with grasshopper surveys in all heavy grain-producing areas.

Arkansas personnel emphasized survey in likely host fields and grasses along roadsides bordering major highway and railroad rights-of-way. Particular emphasis was given to training of additional personnel in detection of this species.

Both visual inspection and sweepings were made in most Tennessee counties.

In Alabama, surveys were made on many properties, as small grain plantings increased in several counties in the State.

Mississippi cereal leaf beetle survey was limited to the west-central counties of the State.

Cuban May Beetle

During the year Plant Pest Control Division personnel did very little survey and no control work on the Cuban May beetle. However, reports by Mr. Dowling, Dr. Wolfenbarger, and the County Agent indicate that it has continued to spread in Dade County, Florida, and is apparently building higher populations in the generally infested area. They advise that they have received calls by property owners in regard to foliage damage from this pest. The host range is not known at present, but the adult is reported to have been found feeding on several species of plants other than Trema mollis.

European Chafer

The survey for European chafer in the Southern Region consists of looking for adults in black light traps which are operated for other purposes. The operators of these traps are reminded to look for this insect when examining the material taken during the season when we would expect flights. Several traps were operated in Tennessee and a lesser number in North Carolina, South Carolina, and Arkansas during the 1963 season. Considerable survey for this pest is conducted incidental to other work, especially by men who have received instructions through the interregional training program. During the early part of the 1964 season, traps were in operation in Florida and Tennessee, and visual survey had been conducted in seven counties in North Carolina.

Golden Nematode

Golden nematode surveys have been conducted in the Southern States for the past 15 years. The surveys are limited to principal potato-producing areas. One-half of the properties sampled were in the Rio Grande Valley of Texas, which is considered a strategic area by its location adjoining Mexico. No golden nematode was found.

Table 8 .—Golden Nematode Program, Survey and Detection

State	Surveyed		Samples collected	Positive specimens
	Properties	Acres		
Alabama	31	... 1/	31	...
Florida	2	50	2	...
Texas	33	2,780	246	...
Total	66	2,830	279	...

1/ All samples from grader station; no acres involved.

Gypsy Moth

Gypsy moth surveys, using synthetic lure and Johnson traps, were operated in eight States during the adult season of 1963. The traps were strategically located on interstate highways, camping sites, state and national parks, freight centers, and railroad terminals. Alabama, North Carolina, and South Carolina were included in this survey, in addition to the five States listed for fiscal year 1963. No gypsy moths were captured.

Table 9.—Gypsy Moth Program, Survey and Detection, calendar year 1963

State	Survey	
	Counties	Locations trapped
Alabama	21	170
Arkansas	13	115
Georgia	31	162
Mississippi	19	139
North Carolina	37	226
Oklahoma	19	58
South Carolina	2	14
Tennessee	44	207
Total	186	1,091

By the end of June, less than 100 locations had been trapped in 3 States in the 1964 season's survey, as most of this work is conducted later in the summer.

Hoja Blanca

Sogatia orizicola Muir is the insect vector of hoja blanca, a very destructive disease of rice. Both the vector and the disease have been found in very limited areas of Louisiana, Mississippi, and Florida in previous years.

Because of the continual threat of these pests to the rice industry in the Region, surveys are made each year to determine whether either is present. Surveys in the principal rice-producing counties of Arkansas, Louisiana, Mississippi, and Texas were negative during the year. One field of cultivated rice and wild rice plants in the same general area were checked in Oklahoma with negative results. Neither the vector nor the disease was found on rice planted on the road shoulders of a new highway in Hancock County, Mississippi; however, the rice was destroyed.

In June 1963, a leafhopper was found on Kreamer Island near Belle Glade, Palm Beach County, Florida, which was later identified as Sogatia orizicola.

Several diseased volunteer plants of red rice were found on Rabbit Island. As a result of these finds, approximately 300 acres of rice on Kreamer Island and 60 acres of sugarcane on Rabbit Island were treated three times with malathion at one pound per acre.

During the latter part of the fiscal year neither the vector nor the disease was found in Florida, nor are they known to be present within the Region.

Table 10.--Hoja Blanca Program, Survey and Control Activities, Fiscal Year 1964

State	Survey and detection				Control	
	Surveyed		Found infested		Insecticide	
	Properties	Acres	Properties	Acres	Treated by air	
					Properties	Acres
Arkansas	199	18,762	...	...	...	...
Florida	61	6,361	2	335	6	1,080
Louisiana	1,125	112,580	...	...	...	...
Mississippi	26	3,349	...	...	...	...
Oklahoma	1	166	...	...	...	...
Texas	610	66,339	...	...	...	...
Total	2,022	207,557	2	335	6	1,080

Khapra Beetle

Despite an intensive yearly survey in the most susceptible areas, khapra beetles have not been found in the Southern Region since 1960. To assure their early detection in the event of an introduction, inspections are made yearly at the most hazardous locations in every State.

In States having port facilities, particular attention is devoted to inspections of all grain and burlap storage areas in the vicinity. Mobile, Alabama; New Orleans, Louisiana; Charleston, South Carolina; Savannah, Georgia; Jacksonville, Florida; and Galveston, Houston, Beaumont, and Port Arthur, Texas, are given special consideration. The grain-growing areas of west Texas and Oklahoma are surveyed each year, as are the rice sections of Arkansas, Louisiana, and Texas. In the larger cities and railway terminals, the seed houses, feed mills, and grain and burlap storage facilities are inspected.

Many properties in Texas were reinspected after notice was received in March of an infestation in Yuma, Arizona. The Yuma properties were thought to have received shipments from the Texas concerns. This work was more concentrated in the Amarillo and Lubbock areas and continued until mid-May. All collections submitted were negative. On-the-farm inspections were made in those counties where little or no commercial storage existed.

During the 1964 fiscal year, personnel from the Southern Region assisted in tracking down and treating seven lots of materials that came into this country aboard infested ships and reached interior points before being detected. In March two railway cars were treated in Texas, one in Dallas and one in San Antonio, for possible infestation with khapra beetle. These cars had transported cargo from the SS Werdenfelt, which was found infested after the cargo was unloaded in New York.

In Tennessee, four cartons of T-shirts, shipped from Pakistan via New York to Cleveland, Tennessee, were fumigated as a precautionary measure. Sorghum seed which originated in New Mexico was inspected and found apparently free of khapra beetle. A report was received from a Plant Quarantine inspector regarding burlap bagging shipped to American Finishing Company, Memphis, Tennessee, suspected of being infested with khapra beetle. A check was made and the products were found and fumigated according to approved quarantine regulations.

In Alabama, on June 18, 1964, Pennsylvania Railroad Car #372-657 was located and fumigated with methyl bromide by the Birmingham Southern Railroad under the supervision of a PPC inspector when it was learned that this car had been exposed to khapra beetle infestation. On June 26, 1964, a report was received to the effect that 143 bales of imported cloth apparently infested with khapra beetles were being shipped by Highway Express from Norfolk, Virginia, to West Point Bleachers and Dye Works, Lanett, Chambers County, Alabama. An investigation revealed that the cargo in question had been delivered to consignee and that two transporting trucks were en route to their home bases at Greenville, South Carolina. Arrangements were made immediately to handle both cargo and trucks under proper safeguard.

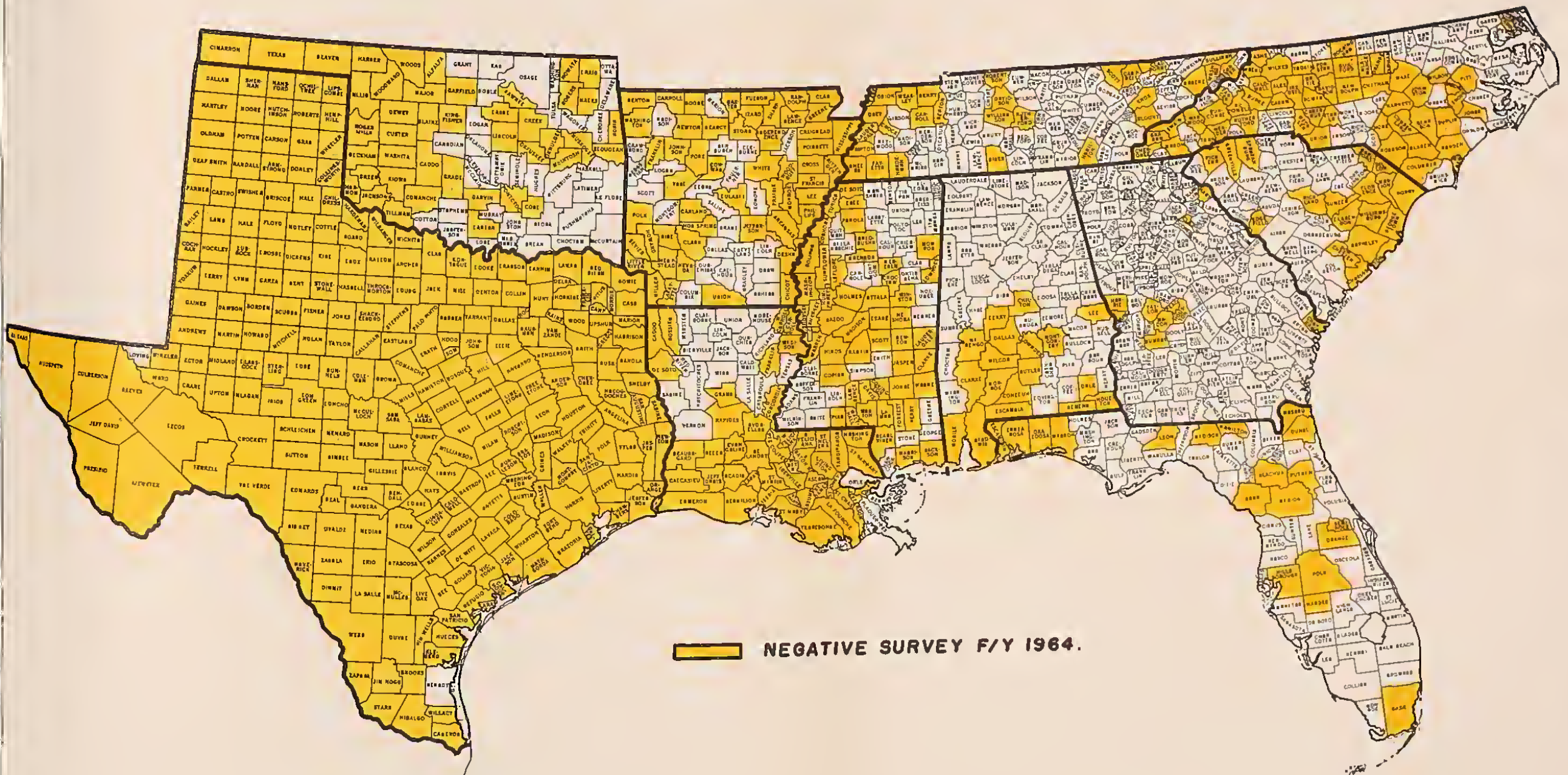
During the fiscal year, 4,715 properties were inspected in the 11 States of the Southern Region, as follows:

Alabama	87	Louisiana	639	South Carolina	115
Arkansas	250	Mississippi	209	Tennessee	223
Florida	69	North Carolina	355	Texas	2,634
Georgia	19	Oklahoma	115		

All surveys for this serious pest of stored grain were negative, for the fourth consecutive year, in the Southern Region.

UNITED STATES DEPARTMENT OF AGRICULTURE
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SOUTHERN REGION

KHAPRA BEETLE



GRASSHOPPER

Division activity on grasshopper was limited to survey and County Agent contact in northwest Texas and central and western Oklahoma. There were no organized grasshopper control programs on rangeland because of scattered light infestations and lack of interest by ranchers. In Arkansas the activity was limited to crop margins on an unscheduled basis incidental to other program activities.

The fall adult survey in Texas and Oklahoma indicated light infestations over most of the area. Grasshopper infestations on short grass range in the Texas Panhandle did not develop. Threatening to moderate infestations were found on cropland acreage in central and south-central Oklahoma.

Spring conditions in Texas were unfavorable for eggs because of dry weather, resulting in a late hatch when moisture was received. Surveys in June, following showers, indicated a light, spotty hatch under way. Nymphal surveys in Oklahoma developed threatening to moderate infestations on scattered small blocks of rangeland in Beckham, Carter, Ellis, Harmon, Murray, Pittsburg, Roger Mills, and Woodward Counties, Oklahoma, and at scattered locations on cropland margins throughout the State. Scattered small bands of Dissosteira longipennis were observed in western Oklahoma.

Near the end of the fiscal year a small, cooperatively financed program developed in Pittsburg County, Oklahoma, which will be carried into and reported in the next fiscal year.

The cooperative agencies were kept informed of survey results and of Plant Pest Control policy and extent of aid which could be given at the request of local County Grasshopper Committees.

IMPORTED FIRE ANT

From the standpoint of acreage treated, fiscal year 1964 has been the most productive year since the beginning of the Imported Fire Ant Program. The use of mirex bait has made possible the application of suppressive measures wherever needed, regardless of land use or population density. The reduced cost of the program, through the use of low volume bait and wider swath spacing, has increased the acreage that can be treated with available funds and has encouraged towns, cities, and counties to contribute financially to the cost of the program. There is every indication that this will continue and expand. Some counties are now placing, and others are considering, special tax levies to raise money to cooperate in imported fire ant programs. In Mississippi, for example, the cities and towns have supplied most of the matching funds for the imported fire ant work. The city of Atlanta, Georgia, raised funds to defray approximately one-third the cost of a program. Colorado and Wharton Counties, Texas, raised matching funds for a program to treat all the infested acreage in the vicinity of Eagle Lake. There is no doubt of the increased interest being manifested in imported fire ant control.

In Alabama, survey, regulatory, and eradication activities have been conducted throughout the State, with major emphasis being placed on and around the periphery of the generally infested area and in the northern counties of the State. To date, most of the area north of Birmingham, Alabama, is free of imported fire ant. In an effort to maintain this status, surveys are made throughout the area and all infestations found are treated immediately. Where the infestations are small and of an incipient nature, ground machinery is used in the application of the control measures; in larger areas, aircraft is employed. This year some 50,000 acres in the Anniston, Decatur, and Gadsden areas were treated by air to eliminate rather sizable infestations.

In Arkansas, surveys were made throughout the southern part of the State, and again infestations were found to be confined to Ashley and Union Counties. At no place was a sizable block of infestation found, but in a number of places scattered mounds were located. These mounds and a reasonable periphery were treated. During the year approximately 13,000 acres in the two counties were treated for imported fire ant control. In addition, approximately 11,000 acres were considered adequately treated and were brought into the fiscal year 1964 records on the basis of the first application only of a planned two-application chemical treatment made during fiscal year 1963. At the close of the year, no active mounds were known to exist in the State of Arkansas, although about 700 acres of infestation, added in Union County during June, had not received overall treatment.

In Florida, surveys revealed that, despite a strong regulatory program, natural spread is continuing. Most of this spread is in the central part of the State, with major new infestations being found in Polk and Manatee Counties. Considerable progress was made during the year in imported fire ant treatment, particularly in the northwestern part of the State. Most of the work was of a control nature and was carried out in cooperation with local farmers and county organizations.

In Georgia, three large contracts were completed during the fiscal year—one in the vicinity of Atlanta, one near Macon, and one in the Savannah District.

In each instance this work was a continuation of the program started in the previous fiscal year. An additional large contract was let to continue the work in Atlanta, and this was completed during the fiscal year. An aggregate total of 970,453 acres was treated in Georgia during the year, the largest acreage treated in any single State.

In Louisiana, no new parishes were found to be infested during the year; however, extensions totaling some 900,000 acres were reported in 28 previously known infested parishes. Treatment was applied to approximately 441,000 acres of land, including the re-treatment of some 6,700 acres. Probably the most significant development on imported fire ant control in Louisiana this year was a cooperative program initiated by the State with growers in the generally infested area. The Louisiana Department of Agriculture secured a special appropriation to be used as a revolving fund for procurement of insecticide to be sold to the farmers at cost, thus making imported fire ant bait available to the farmers at a reasonable cost. During the year individuals purchased over \$50,000 worth of material for the control of imported fire ants on their properties.

In Mississippi, farmer cooperative programs have continued in many of the counties around the periphery of the infested area. Appraisal surveys indicated effective results from aerial treatments in the city of Tupelo (Lee County), and in Washington County.

The principal infestation of imported fire ants in North Carolina occurred in Brunswick, Carteret, Craven, Cumberland, and Onslow Counties. Surveys this year revealed no additional counties to be infested with imported fire ants and little spread in the counties listed above. During the year, in cooperation with the county and State officials, an eradication program was undertaken. One block of more than 134,000 acres in Carteret and Craven Counties was treated, by aircraft, with two applications of mirex bait. Other smaller areas were treated by ground or air in Carteret, Craven, Brunswick, Cumberland, and Onslow Counties. Appraisal surveys in the area indicated excellent results, and there is hope that progress is being made toward the elimination of the imported fire ant in North Carolina.

In South Carolina, aerial applications of mirex bait were made in Beaufort, Calhoun, Horry, Jasper, Orangeburg, and Richland Counties, with the major part of the work taking place in Orangeburg and Jasper Counties. Most of the known infestation in these counties was treated at this time. One large area in the vicinity of Charleston still remains to be treated, and it is hoped that this work can be accomplished during the early part of fiscal year 1965. Surveys indicate that the imported fire ant has been eradicated from Clarendon, Marion, and Spartanburg Counties.

In Texas, imported fire ants were found for the first time in Austin, Galveston, and Nacogdoches Counties. The acreage in Austin and Galveston was small and was treated immediately. Approximately 1,500 acres in and around the city of Nacogdoches in Nacogdoches County were found to support a light to medium infestation, and arrangements are in progress for the treatment of this area. Additional areas of infestation were found in 12 Texas counties previously known to be infested. In the State of Texas, priority was given to the treatment of isolated infestations and peripheral areas throughout the

State. The largest single block treatment ever organized in Texas was accomplished in Colorado and Wharton Counties in cooperation with county governments. Approximately 28,000 acres were treated to eradicate the imported fire ant from the vicinity of Eagle Lake.

In Oklahoma and Tennessee, imported fire ant activities were confined to survey work, with no infestations being found during the year in these States.



Things grow big in Texas. Even the imported fire ant seems to exert a little extra energy.

Table 11.--Imported Fire Ant Program, Survey and Control Activities, Fiscal Year 1964

State	Survey and detection			Control					
	Surveyed		Found infested	Acres treated with insecticide					
	Properties	Acres ^{1/}		Chemical		Bait		Total	
				Ground	Air	Ground	Air		
Alabama	7,318	...	2,926	56,424	22,242	...	1,619	54,245	78,106
Arkansas	12,867	...	79	13,595	730	11,297	95	13,170	25,292
Florida	7,578	...	366	224,806	7	...	829	89,599	90,435
Georgia	30,401	...	4,165	822,051	1,037	...	3,532	965,884	970,453
Louisiana	22,757	1,360,240	13,451	941,159	20,097	775	58,580	362,300	441,752
Mississippi	16,120	...	876	223,188	54,817	...	100,995	76,214	232,026
North Carolina	69,281	...	1,443	38,871	48	...	1,793	142,751	144,592
Oklahoma	411	...	...	...	...	...	...	...	...
South Carolina	30,451	...	1,269	321,122	21	...	5,506	318,591	324,118
Tennessee	61,999	...	...	...	...	...	...	...	...
Texas	22,156	...	...	228,888	5,968	...	6,249	28,690	40,907
Total	281,339	1,360,240	24,575	2,870,104	104,967	12,072	179,198	2,051,444	2,347,681

^{1/} The reporting of "acres surveyed" on Imported Fire Ant Program is optional (by State).

Table 12.--Imported Fire Ant Program, Regulatory Activities--Inspection for Certification
Fiscal Year 1964

State	Inspection for certification						
	Properties	Acres		Processing plant visits	Shipping point visits	Industry site visits	Other
		Nursery	Other				
Alabama	1,213	9,017	2,645	22	155	147	302
Florida	1,248	3,163	3,031	95	575	264	243
Georgia	408	2,323	143	1	50	30	3
Louisiana	767	8,336	227	2	45	30	68
Mississippi	1,134	3,666	2,081	3	178	555	122
South Carolina	31	94	2	...	7	8	8
Tennessee	...	...	...	...	...	...	1
Texas	836	3,082	15	2	...	...	...
Total	5,637	29,681	8,144	125	1,010	1,034	747

Table 13.--Imported Fire Ant Program, Regulatory Activities--Certification and Commodity Treatment
Fiscal Year 1964

State	Acres treated for certification (soil)	Commodity lots treated					
		Fumigated	Dipped	Soaked	Heated	Other	Total
Alabama	3,705	33	2	...	2,355	16	2,406
Florida	1,705	1	...	...	...	15	16
Georgia	750	95	7	...	50	328	480
Louisiana	4,262	8	8	9	...	31	56
Mississippi	1,028	149	3	...	...	10,929	11,081
South Carolina	118	...	...	...	...	...	...
Texas	483	...	...	...	...	120	120
Total	12,051	286	20	9	2,405	11,439	14,159

Table 14.--Imported Fire Ant Program, Regulatory Activities--Commodities Treated
Fiscal Year 1964

Commodities	Lots treated						
	Alabama	Florida	Georgia	Louisiana	Mississippi	Texas	Total
Fruits and Vegetables	...	...	...	...	1	...	1
Nursery Stock	...	4	7	39	27	120	197
Cotton Products	16	...	...	...	...	...	16
Soil	2,388	12	290	17	148	...	2,855
Transplants	2	...	...	...	...	...	2
Machinery and Equipment	...	...	157	...	10,904	...	11,061
Other	...	...	26	...	1	...	27
Total	2,406	16	480	56	11,081	120	14,159

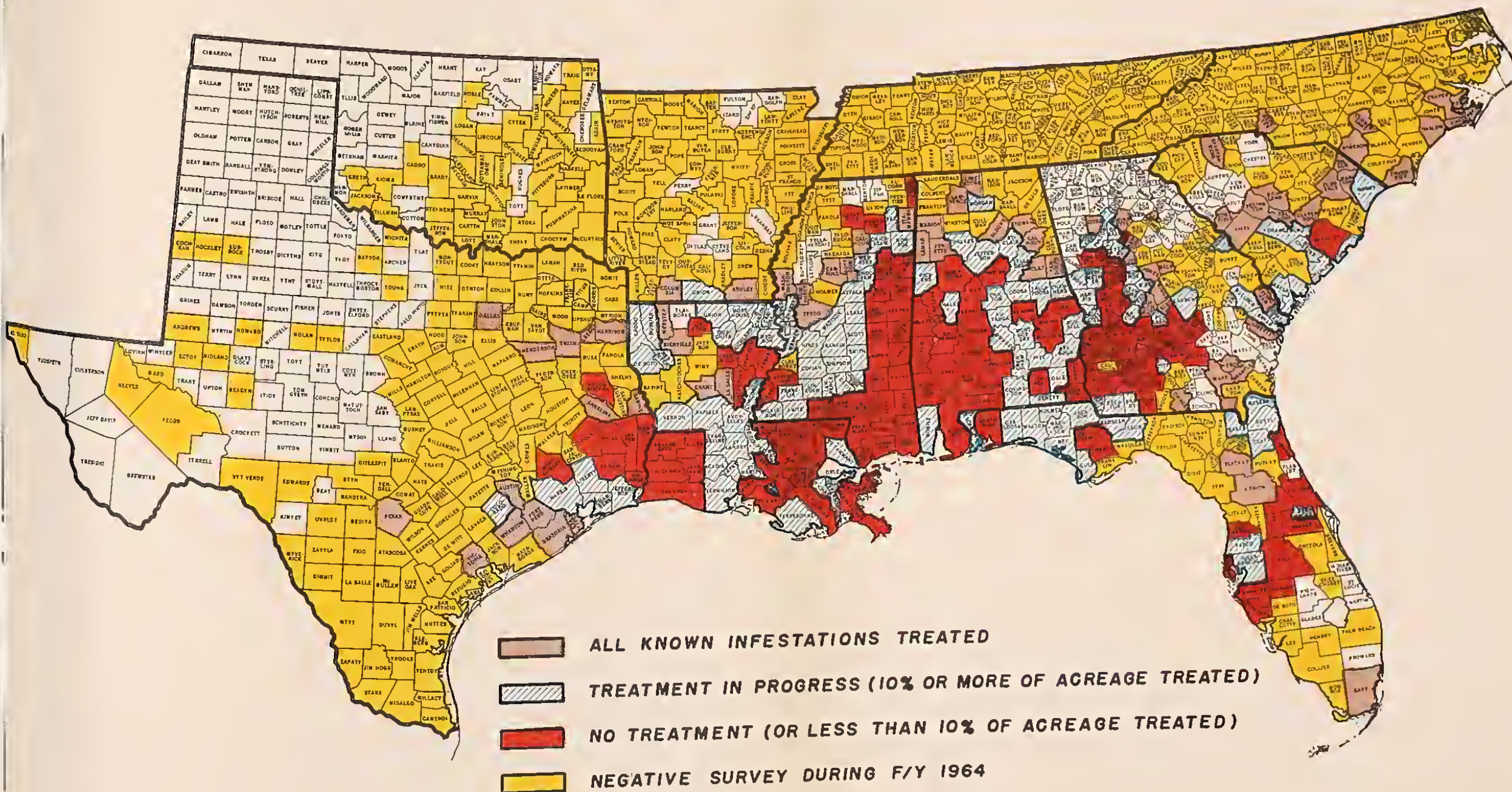
Table 15.--Status of Imported Fire Ant Program, June 30, 1964

State	Estimated acres found infested from beginning of program	Acres treated		Estimated acres remaining to be treated ^{1/}
		Complete treatment from beginning of program through 6-30-64	First application only of two-application treatment	
Alabama	7,762,848	724,043	...	7,038,805
Arkansas	105,566	104,866	...	700
Florida	2,322,068	389,392	...	1,932,676
Georgia	7,027,519	2,727,590	47,408	4,299,929
Louisiana	9,200,342	2,009,660	137,005	7,190,682
Mississippi	4,339,240	813,891	3,444	3,525,349
North Carolina	162,853	162,853	...	...
South Carolina	660,317	356,192	...	304,125
Texas	2,221,241	248,340	7,810	1,972,901
Total	33,801,994	7,536,827	195,667	26,265,167

^{1/} Includes acres which have received no treatment, and those which have received the first application only of the two-application treatment.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE - PLANT PEST CONTROL DIVISION
SOUTHERN REGION

IMPORTED FIRE ANT



JAPANESE BEETLE

Japanese beetle survey work consisted of a delimiting survey in north Georgia and northwestern South Carolina, a more intensive survey in Tennessee east of the Cumberland Mountains, and detection surveys throughout the remainder of the Region. In North Carolina, which is generally infested, all surveys were for special purposes, such as testing traps and checking for emergence.

A student at Texas Technological College at Lubbock, Texas, reported capturing a Japanese beetle in Yellowhouse Canyon near the city limits on April 13, 1964. Subsequent surveys revealed no indication of the presence of this insect, although a heavy trapping program was conducted in the immediate vicinity.

A somewhat similar situation occurred in Jacksonville, Florida, in April 1964, when an elementary school student submitted a Japanese beetle in an insect collection and reported it had been recovered from an automobile radiator. Further investigation indicated that this radiator had been removed from the car and cleaned in the course of repairs the previous September and that the car had not been used outside the city since that time. More than 500 traps were placed in that portion of the city, but no specimens were found.

For the Region as a whole, surveys indicate some intensification and local spread of known infestations. Appreciable buildup was noted in Atlanta and Dahlonega, Georgia. The trapping in the vicinity of Loudon, Tennessee, indicated very effective control had been obtained on a 10,000-acre block in that area, except that beetles were observed in the flagged-out areas. Single catches were observed in Birmingham, Jefferson County, and Fort Payne, De Kalb County, Alabama. These scattered catches, together with similar ones from other parts of the Region, indicate that hitchhikers are continuing their activities and infestations can be expected almost anywhere and anytime.

The major portion of control activities was conducted in East Tennessee to reduce known infestations to a minimum. Approximately 1,300 acres in 9 counties in North Carolina, and about 200 acres in Richmond County, Georgia, were treated with insecticide.

Collections were made of the parasite Tiphia in West Virginia, and these were released in the vicinity of Dahlonega and Augusta, Georgia. At present, it is not known whether these colonies will become established locally. The people of western North Carolina have been spreading milky disease spore dust in various localities for several years. Surveys are planned next year to determine how much of the recently noted population reduction may be due to this disease. For several years, heavy beetle populations presented a formidable problem in the movement of string beans from western North Carolina into Tennessee. This problem is still present, particularly in the northwest counties of North Carolina; however, population reductions and improved grower cooperation in west and central North Carolina have combined to substantially reduce this regulatory problem in these areas.

No major changes are anticipated in this program in the future, except to make observations on biological controls and, if the results warrant it, to encourage, by all means possible, participation in this work by the States, cities, and other groups of affected persons.

Table 16.--Japanese Beetle Program, Survey and Control Activities, Fiscal Year 1964

State	Survey and detection						Control		
	Visual survey		Locations trapped	Positive specimens	Found infested		Acres treated with insecticide		Total
	Properties	Acres			Properties	Acres	Ground	Air	
Alabama	58	114	455	3	...	...	...	...	...
Arkansas	...	...	306	...	...	...	...	...	...
Florida	...	...	739	...	...	...	...	...	...
Georgia	52	59	1,029	1	...	...	197	...	197
Louisiana	35*	...	53	...	...	...	...	...	...
Mississippi	...	...	235	...	...	...	...	...	...
North Carolina	7,017	52,948	...	...	...	...	1,340	...	1,340
Oklahoma	...	...	105	...	...	...	...	...	...
South Carolina	10	155	907	...	...	...	...	...	...
Tennessee	1,412	4,011	1,656	179	52	4,385	848	5,749	6,597
Texas	2	5	176	...	...	...	...	...	...
Total	8586*	57,292	5,661	183	52	4,385	2,385	5,749	8,134

*Changed according to memo from SPPCR dated 2-2-65

Table 17.--Japanese Beetle Program, Regulatory Activities, Fiscal Year 1964

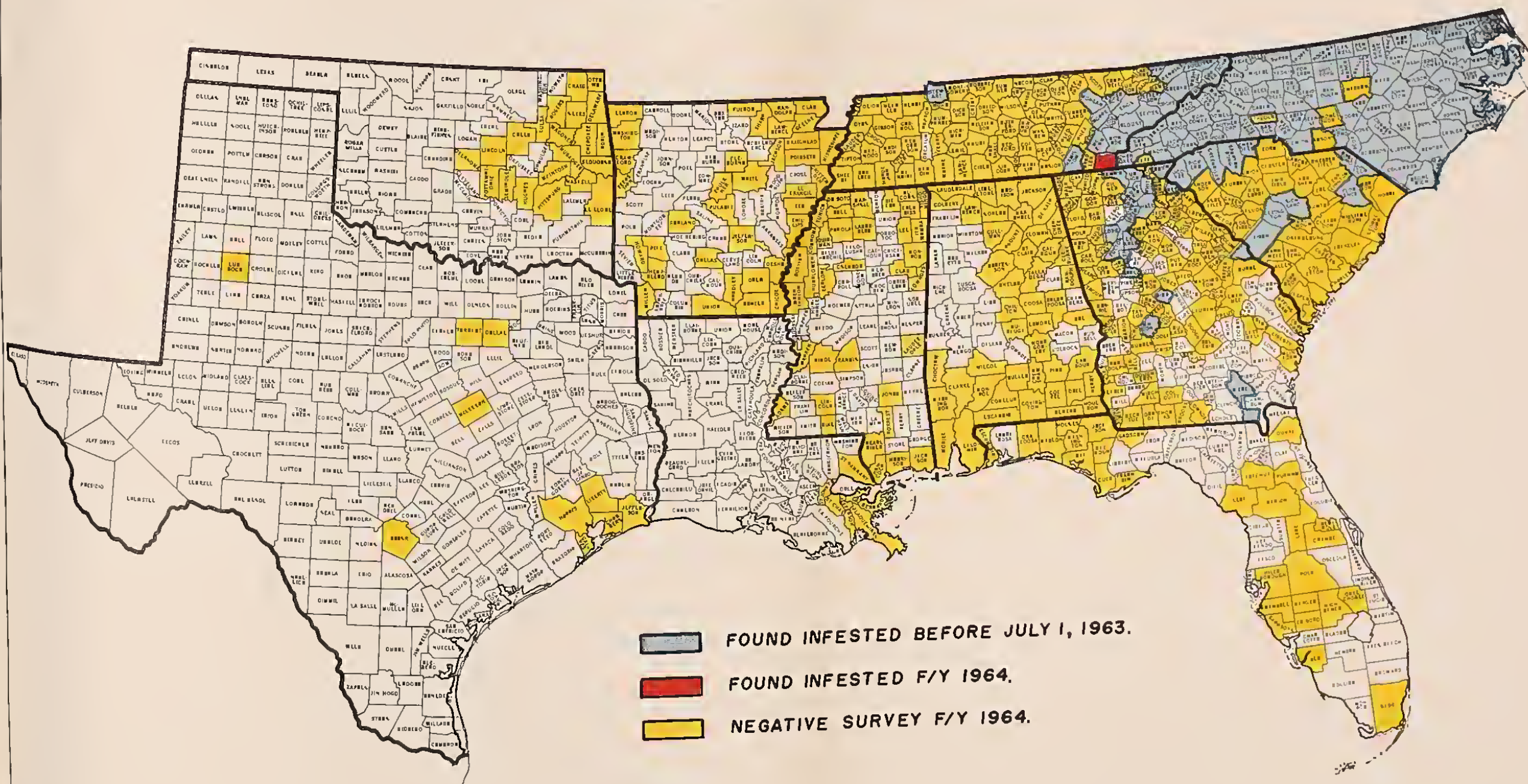
State	Inspection for certification						Acres treated for certification		Commodity lots treated				
	Properties	Acres		Processing plant visits	Shipping point visits	Other	Soil	Foliage	Fumigated	Dipped	Soaked	Other	Total
		Nursery	Other										
Alabama	2	...	...	...	...	13	...	...	...	...	...	...	...
Florida	1	...	...	...	...	18	...	...	...	...	...	...	...
Georgia	...	...	...	...	...	...	175	...	...	...	...	...	...
Louisiana	1	...	...	...	...	59	...	...	...	...	...	22	22
Mississippi	...	...	...	...	...	...	...	...	1	...	...	...	1
N. Carolina	525	979	221	33	586	16	409	...	324	39	193	396	952
S. Carolina	9	21	...	...	9	...	18	...	6	...	...	...	6
Tennessee	56	...	...	3	82	23	93	63	1	...	...	92	93
Texas	...	...	...	...	...	35	...	...	...	...	...	...	...
Total	594	1,000	221	36	677	164	695	63	332	39	193	510	1,074

Table 18.--Japanese Beetle Program, Regulatory Activities--Commodities Treated, Fiscal Year 1964

Commodities	Lots treated					
	Louisiana	Mississippi	North Carolina	South Carolina	Tennessee	Total
Fruits and Vegetables	...	...	540	6	...	546
Nursery Stock	...	...	303	...	...	303
Transport	22	...	...	...	...	22
Soil	...	1	98	...	93	192
Transplants	...	...	10	...	...	10
Other	...	...	1	...	...	1
Total	22	1	952	6	93	1,074

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE - PLANT PEST CONTROL DIVISION
SOUTHERN REGION

JAPANESE BEETLE



BURROWING NEMATODE

Spreading decline of citrus has been present in Florida for more than 30 years, but not until 1953 was it established that the burrowing nematode was its primary cause. More than 200 species of plants, including many herbaceous and woody plants, are hosts and are moved in volume throughout the United States. In past years, the burrowing nematode has become established in citrus groves and citrus nurseries on numerous occasions by transfer from nearby infested ornamental hosts.

Objectives of the program are to prevent further spread of the burrowing nematode and, if possible, to eradicate existing infestations in citrus-growing areas in order that the land again may be returned to profitable citrus production. These objectives are accomplished by:

1. Removing infested trees, plus a safety margin of healthy trees, and fumigating the area with a soil nematocide.
2. Placing chemical barrier strips around infestations to prevent further spread when area eradication by push-and-treat is not immediately possible. (Barriers are a minimum of 16 feet wide; they are re-treated every 6 months with a soil fumigant and herbicide is applied to eliminate weed growth.)
3. Requiring the approval of planting sites for growing commercial citrus nursery stocks.
4. Regulating the movement of hazardous articles likely to spread the burrowing nematode.

The Division of Plant Industry of the Florida Department of Agriculture assumes responsibility for the regulatory and control phases of this program, while the Plant Pest Control Division is primarily responsible for survey.

Since 1955, when the control program was initiated, eradication treatments have been applied to more than 6,000 acres of citrus. An estimated additional 8,000 to 10,000 acres of citrus are infested. As rapidly as possible, the remaining infested acreage is being isolated by chemical barriers to retard further spread. Approximately 200 miles of chemical barriers have been installed, surrounding some 6,000 acres of spreading decline areas. Some non-infested citrus trees must be enclosed by the barriers in order to allow a margin of safety around infested trees.

During this fiscal year surveys were conducted in all nurseries shipping to other citrus-growing States and to citrus-growing areas in Florida. Also, surveys were made in about 450 citrus groves not inspected previously. More than 100 groves were found infested for the first time. Intensive delimiting surveys were made in about 350 groves, containing over 6,500 acres, for accomplishment of control actions, either push-and-treat or placement of barriers.

Margins of pushed and treated areas are inspected annually for a minimum three-year period to determine that further spread has been stopped. Trees replanted on the fumigated areas are surveyed to evaluate eradication treatments.

This year the laboratory microscopic examination technique has been made more efficient through the use of a lubricated sliding microscope stage and a new plastic examination dish. These combined improvements have reduced, by 20 percent, the time required to examine a sample. Better protection for samples in the field has resulted from the procurement of ice-making machines and custom-made, insulated sample-carrying boxes for field use at the principal stations conducting burrowing nematode survey.

Following is a tabular summary of the work accomplished in Florida during fiscal year 1964:

SURVEY OF NURSERIES

Type	Properties surveyed	Acres surveyed	Properties found positive
Citrus	291	656.76	11
Ornamental	117	439.85	21
Pecan	13	100.50	...
Nursery sites	308	1,881.64	9
Total	729	3,078.75	41

SURVEY PREREQUISITE TO APPLYING CONTROL MEASURES IN CITRUS GROVES

<u>Push-and-Treat</u>		<u>Barriers</u>	
Properties surveyed	73	Decline areas surveyed	64
Acres surveyed	1,479	Properties surveyed	291
Acres fumigated	355	Acres surveyed	5,083
		Barriers installed	58
		Total linear footage fumigated	237,422

FOLLOW-UP SURVEY ON CONTROL TREATMENTS APPLIED PREVIOUSLY

<u>Margins of Push-and-Treat</u>		<u>Trees Replanted on Push-and-Treat Areas</u>	
Properties surveyed	238	Properties surveyed	102
Properties found positive	42	Properties found positive	15
Acres surveyed	5,873	Acres surveyed	717
		Trees sampled	47,898
		Number of trees positive	88

Properties Protected by Barriers

Barriers surveyed	123
Properties surveyed	549
Linear footage in barriers surveyed	478,240
Trees sampled adjacent to protected side of barrier	14,919
Acres enclosed by the barriers surveyed	2,757
Properties with trees infested adjacent to barrier-- protected side	33
Trees positive in row adjacent to the barrier--protected side	104
Trees positive per mile of barrier	1.15
Properties with infestations at locations other than immediately adjacent to the barrier	31

The Winter Garden Nursery, Waxahachie, Ellis County, Texas, found infested in fiscal year 1962, was inspected in January and again in March, and infestations were found each time. The samples were taken by the Texas Department of Agriculture and inspected by our personnel. The Texas Department of Agriculture supervised the treatment of this nursery. The known infested Pan American Nursery at Brownsville, Cameron County, remained untreated at the close of the year.

In April 1963, the Plant Pathologist of the Texas Agricultural Experiment Station, Weslaco, Texas, assisted by PPC and State personnel, planted sour orange seedlings, lemons, limes, and okra in the Pan American Nursery at Brownsville. The purpose was to determine whether the nematode would transmit from ornamentals to citrus in this area. Okra was used because it is considered a quick indicator where the pest is present. In January 1964, all the citrus and okra plants were removed, and root samples were taken from each plant. These were processed, incubated, and read by a PPC inspector. All were found to be negative. The results were furnished the Weslaco Experiment Station.



Examination of nematode specimens in plastic dish, using stereomicroscope with sliding stage and transmitted light. (Incentive award presented to J. A. West and W. J. Breidenbach for development of this method.)



Jeep-mounted soil auger, requiring 5-man crew to take root samples.



Newly developed tractor-mounted soil auger, requiring only three operators to take root samples.

Table 19.--Burrowing Nematode Program, Survey and Control Activities, Fiscal Year 1964

State	Survey and detection						Control	
	Surveyed		Samples collected	Found infested		Acres	Properties treated	Acres fumigated
	Properties	Acres		Properties	Acres			
Florida	2,349	38,637	118,586	124	458		134	1,144
Texas	1	1	30	1	1		...	...
Total	2,350	38,638	118,616	125	459		134	1,144

Table 20.--Burrowing Nematode Program, Regulatory Activities, Fiscal Year 1964

State	Inspection for certification		Commodity treatment (lots nursery stock heated)
	Properties	Nursery acres	
Florida	426	1,296	120,724
Total	426	1,296	120,724

SOYBEAN CYST NEMATODE

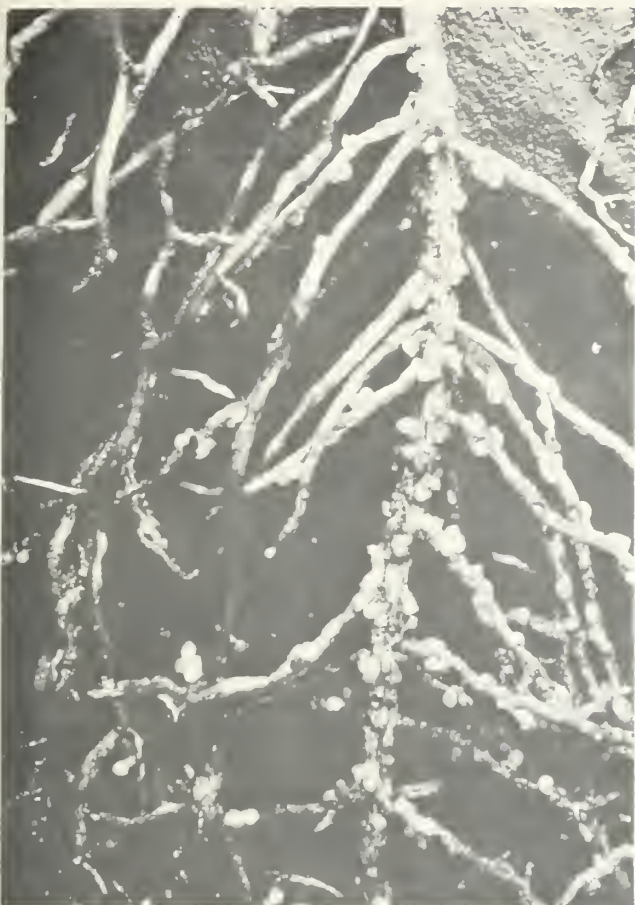
Work on this program in the noninfested States consisted of detection surveys incidental to other work. For the most part, they consisted of symptom surveys with occasional root pulling. In Alabama, some soil samples are taken each year and processed for both soybean cyst nematode and golden nematode. Irish potatoes and soybeans, together with other crops, are grown in rotation on a large acreage, particularly in Baldwin County. All surveys in these States were negative.

In the infested States along the Mississippi River, continued spread and intensification were noted. Infestation was found for the first time in Cross County, Arkansas (confirmed July 1964); Tunica County, Mississippi; and Fayette County, Tennessee. A combination program of symptom surveys and soil sampling was conducted in each State. Intensive surveys were made for regulatory purposes in connection with the production of sugar beets in Arkansas and Tennessee, and of tomato plants in Tennessee. In all cases, infestations found in the counties for the first time during the year were adjacent to previous infestations. Other regulatory activities in these States were of a routine nature.

Infestation in eastern North Carolina continued to intensify and spread locally. It was found for the first time in Brunswick County, which is adjacent to New Hanover County in which the original infestation was found. Surveys in this State were of approximately the same type and intensity as in the Mississippi River area.

The Methods Improvement work in Tennessee and North Carolina continued along the same lines as during the previous year. The tests of resistant soybean varieties look very promising, and it is hoped that some will be available for release to the public in the near future.

During the year, 7,424 nematode collections were submitted to the Gulfport Laboratory for identification; of these, 1,093 were positive. They were received from 19 soybean-producing States in the Central and Southern Regions in which surveys are conducted. At the end of the fiscal year, all samples received had been processed through Gulfport.



Typical cyst nematode infestation in root system of a soybean plant is shown at left.

Photograph below shows typical damage caused by soybean cyst nematodes in infested fields.

(Photographs by Lee Jenkins, University of Missouri)



Table 21.--Soybean Cyst Nematode Program, Survey Activities, Fiscal Year 1964

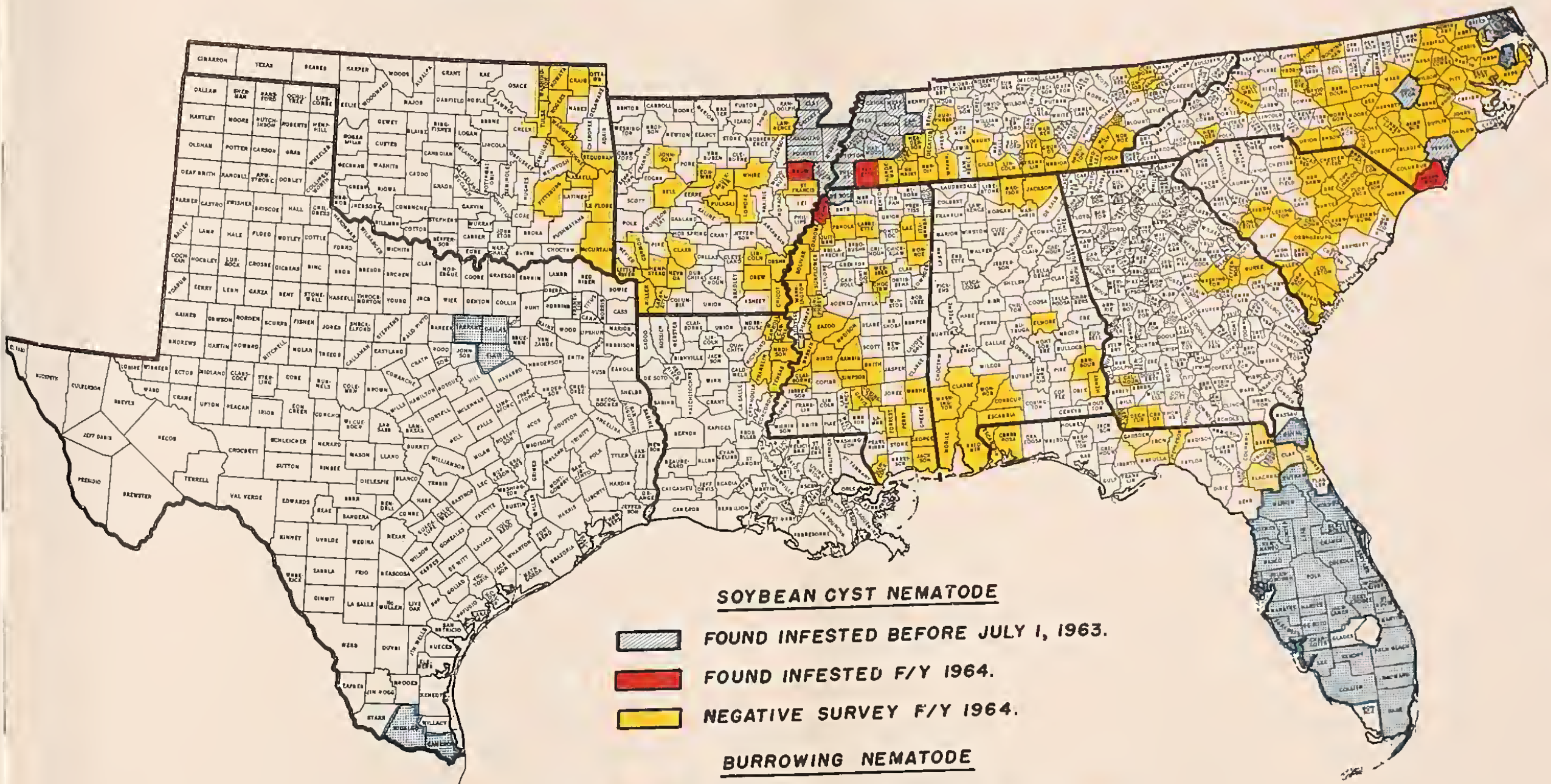
State	Survey and detection				
	Surveyed		Samples collected	Found infested	
	Properties	Acres		Properties	Acres
Alabama	953	29,840	260	...	...
Arkansas	1,302	45,521	1,857	104	7,521
Florida	2	80	2	...	...
Georgia	42	605	14	...	...
Louisiana	126	18,846	...	...	...
Mississippi	486	41,556	2,476	6	430
North Carolina	2,039	21,905	4,381	32	1,807
Oklahoma	61	1,300	...	...	...
South Carolina	6,407	131,521	233	...	...
Tennessee	2,502	50,684	240	85	3,390
Total	13,920	341,858	9,463	227	13,148

Table 22.--Soybean Cyst Nematode Program, Regulatory Activities, Fiscal Year 1964

State	Regulatory									
	Inspection for certification							Commodity lots treated		
	Properties	Acres		Processing plant visits	Shipping point visits	Industry site visits	Other	Fumigated	Other	Total
		Nursery	Other							
Arkansas	23	...	...	25	...	...	136	11	145	156
Mississippi	...	...	...	...	...	...	...	22	...	22
North Carolina	...	...	...	...	...	...	...	...	46	46
Tennessee	103	3	193	19	28	14	110,677	8	289	297
Total	126	3	193	44	28	14	110,813	41	480	521

UNITED STATES DEPARTMENT OF AGRICULTURE
 AGRICULTURAL RESEARCH SERVICE - PLANT PEST CONTROL DIVISION
 SOUTHERN REGION

SOYBEAN CYST NEMATODE - BURROWING NEMATODE





PEACH MOSAIC

Peach mosaic is a virus disease of peach and other stone fruits which is transmitted by a small eriophyid mite that occurs under the bud scales; transmission from tree to tree takes place when infected budwood is used for propagation.

The only control known is the destruction of infected trees.

In the Southern Region, peach mosaic has been found in the States of Arkansas, Oklahoma, and Texas. Inspections for the purpose of certification are made in nurseries and budwood sources, and their environs each year. Diseased trees found in commercial orchards and dooryard or abandoned plantings are removed by the property owners.

The incidence of infection was very low during 1964.

Table 23.--Peach Mosaic Program, Survey, Control, and Regulatory Activities, Fiscal Year 1964

State	Survey and detection				Control		Regulatory				
	Surveyed		Found infected		Mechanical treatment		Inspection for certification				Commodity lots treated ^{3/}
	Properties	Hosts	Properties	Hosts	Properties	Hosts	Properties	Acres Nurs.	Other ^{1/}	Other ^{2/}	
Arkansas	191	529,634	1	3	1	3	116	60	891	403,860	...
Oklahoma	84	703,951	...	...	...	...	185	2,560	1,920	57,026	4
Texas	267	315,606	12	16	12	16	61	642	648	...	...
Total	542	1,549,191	13	19	13	19	362	3,262	3,459	460,886	4

^{1/} Budwood sources and environs.

^{2/} Host trees in dealers' custody.

^{3/} Diseased trees and wild host plants removed from nurseries and budwood sources and environs.

PHONY PEACH

Phony peach disease, which also occurs in wild and cultivated plums, is caused by a virus which is transmitted by several leafhoppers native to the Southern Region. Once infected, a tree never recovers, but becomes stunted in growth, with greatly shortened internodes on the terminal twigs and a reduction in size and number of fruits produced; after one or two years the fruit is not of marketable size. The only practical control is the removal of infected trees and the destruction of wild plum bushes in the environs of commercial orchards. Wild plum is one of the principal hosts of the vector but does not exhibit symptoms of the disease and infected bushes cannot be easily distinguished from healthy ones. Control of the vector is impracticable because the leafhoppers are general feeders and are not confined to peach or plum.

Inspections for phony peach are made in late summer following the harvest of the crop. Trees found infected are delimbed immediately, and the stumps are later removed by the orchard owner and burned. The burning is not required for control, as the virus dies with the tree.

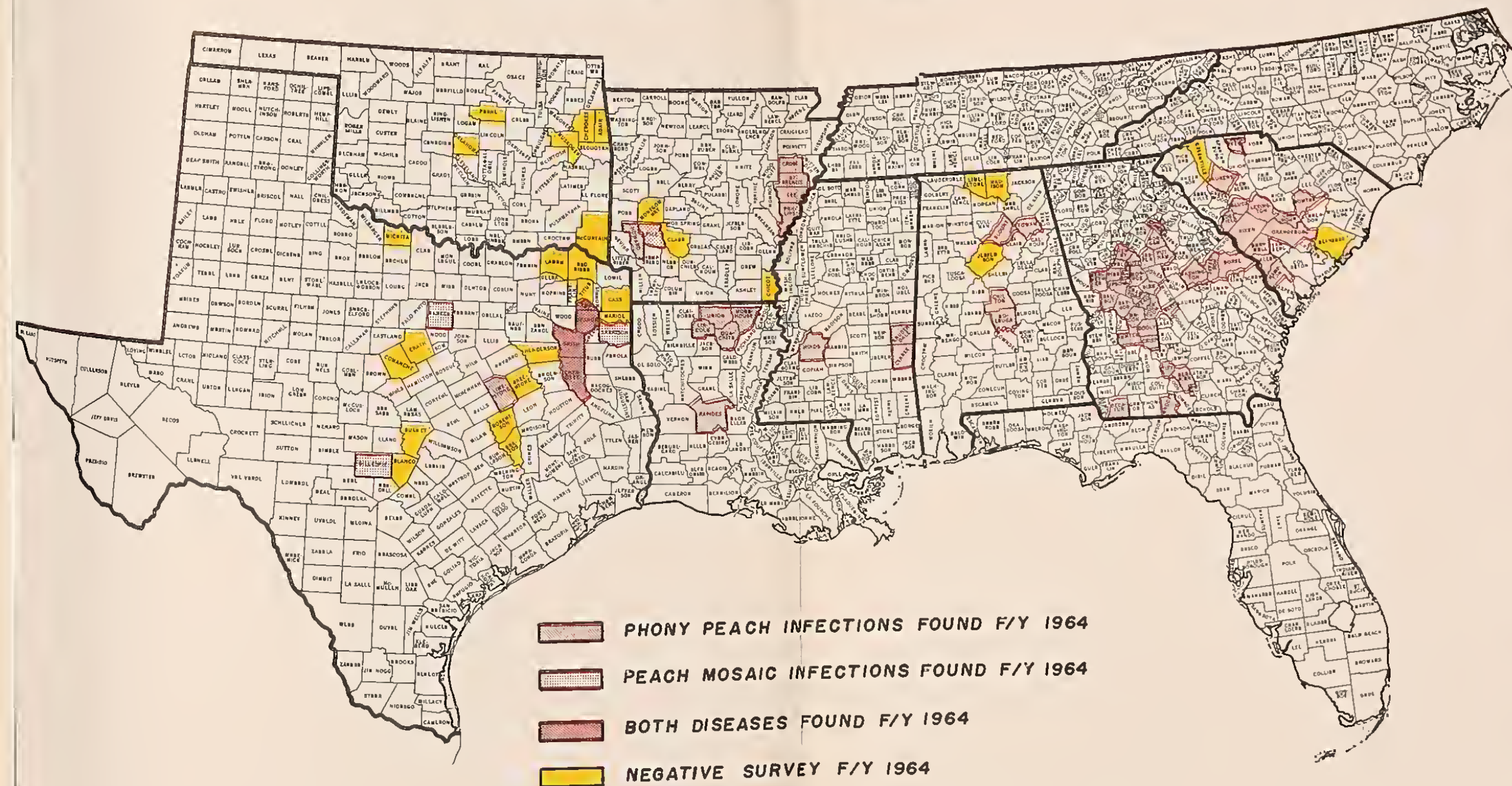
During fiscal year 1964, inspections of commercial orchards, nurseries, and yard plantings were made in Alabama, Arkansas, Georgia, Louisiana, Mississippi, South Carolina, and Texas. Use of herbicide for control of wild plum thickets in the environs of commercial plantings was very successful in Georgia, Mississippi, and South Carolina and, in all probability, accounts in large measure for the low incidence of infection found in these States. Grower interest in this herbicide program has declined in Arkansas. All affected States, except Arkansas, reported lower incidence of infection than in previous years. In Georgia, the incidence again reached an all-time low since the inception of the inspection program, with a figure of 28/100 of one percent, as compared with last year's results of 34/100 of one percent. However, continued unfavorable market conditions in this State have depressed grower interest in replacing old orchards. Unconfirmed reports indicate that by March 1, 1964, Florida growers had set over one-half million trees, which may eliminate Georgia in the early peach markets.

Table 24.--Phony Peach Program, Survey, Control, and Regulatory Activities, Fiscal Year 1964

State	Survey and detection				Control			Regulatory		
	Surveyed		Found infected		Properties	Treated		Inspection for certification		Commodity lots treated ^{1/}
	Properties	Hosts	Properties	Hosts		Mechanical Hosts	Herbicide Acres	Properties	Acres nursery	
Alabama	157	486,420	128	1,228	128	1,228	...	...	...	...
Arkansas	94	318,120	15	54	14	54	...	...	...	...
Georgia	291	3,122,150	253	8,682	268	8,682	19	12	4	...
Louisiana	124	127,828	35	555	35	555	...	...	...	...
Mississippi	21	50,850	15	896	15	896	8	...	...	...
S. Carolina	315	1,606,060	81	329	127	329	168	...	...	...
Texas	98	193,433	8	31	8	31	...	30	369	86
Total	1,100	5,904,861	535	11,775	595	11,775	195	42	373	86

^{1/} Diseased trees and wild host plants removed from nursery sites and environs.

PHONY PEACH - PEACH MOSAIC



PINK BOLLWORM AND WILD COTTON

Pink Bollworm

The pink bollworm, Pectinophora gossypiella, was found in several additional counties and parishes in Arkansas and Louisiana in the latter part of 1963, and populations increased in counties and parishes infested the previous year. Inspections indicated a general increase in infestations in south-central Oklahoma. Heavy infestations in local areas in Matagorda, Reeves, and Pecos Counties, Texas, resulted in commercial damage to the cotton crop. Although some farmers sprayed as many as 26 times in the Coynosa area, losses of one to two bales per acre occurred.

Gin trash and lint cleaner inspections were the principal methods of survey for pink bollworm. These methods in many areas are supplemented by bloom and boll inspections incidental to other program activities. Of major concern was the finding of pink bollworm in 21 counties in Arkansas as compared to 2 counties in the 1962 crop. Pink bollworms were found in Chicot County, which borders the Mississippi River. All or parts of 43 counties were placed under regulation. Pink bollworms were found in 17 parishes in Louisiana in 1963, as compared to 4 in 1962; and 20 parishes, or parts thereof, are now under regulation, as compared to 6 in 1962. This is the most extensive spread in recent years.

Inspections were intensified in Mississippi and Tennessee adjacent to the Mississippi River, but all inspections were negative. Inspections in the other States within the Region were negative for pink bollworm.

Changes in regulations in Louisiana permit the return of cottonseed to the farm of origin if it is processed at a gin rated above 90 percent in kill of pink bollworm. If the cottonseed is processed at a gin rated below that level, it must be treated before it can be returned to the farm. In Arkansas, seed must be held in approved storage under dealer-carrier agreement for approved treatment before it can be returned to the farm of origin.

In Texas, late planted cotton, extension of harvesting dates, and early fall rains delayed plowup. Rains also delayed plowup in Louisiana. Very good compliance with stalk destruction was obtained in Arkansas. Expanded news coverage by newspaper and radio, meetings with growers, slides shown to FFA and 4-H groups, and two series of letters to growers greatly improved the cleanup of cotton stalks in eastern and south-central Oklahoma.

Road stations were operated on the bridges across the Mississippi River from Louisiana and Arkansas leading into the State of Mississippi, and on the main highways in Texas leading into Louisiana and Arkansas. This was a cooperative activity between the Division and the States of Arkansas, Louisiana, and Mississippi.

Wild Cotton

The program for removing and destroying all known wild and ornamental cotton plants in south Florida has continued to be successful in preventing the

spread of pink bollworm to the commercial cotton-producing area of the southeastern United States. By maintaining the nonhost period, the population of pink bollworm has remained at a low level.

During the year, 18,736 plants were removed from 12,955 acres. Pink bollworms were recovered from fruiting cotton forms collected from Collier, Dade, Lee, and Monroe Counties. In Lee County, where some large cotton plants were found, more than a thousand pink bollworm larvae and 17 pupae were recovered from material collected from a single location. This is approximately 88 percent of the total specimens recovered during the year, which clearly demonstrates the hazard involved when even a few cotton plants are permitted to grow for an extended period of time in south Florida.

Inspection of okra and hibiscus, which are secondary hosts for pink bollworm, was negative during the season.

Replacement of the houseboats with faster boats and trailers improved the working conditions in isolated infestations accessible only by water. Another improvement was the use of house trailers rather than tents for sheltering employees at Cape Sable. This change also has reduced time and cost required for establishing and breaking camp in this area.



Edible okra is hazardous from the standpoint of spreading the pink bollworm. Okra grown in infested areas is fumigated before being shipped to market. The photograph above shows okra being loaded into the fumigation chamber in preparation for treatment.



Portable fumigation chamber
used to treat edible okra.

Incinerator at gin used to
burn gin trash.



Baled cotton linters being
fumigated as a prerequisite
for certification for movement
from a pink bollworm infested
area.

Table 25.--Pink Bollworm Program, Survey and Control Activities, Fiscal Year 1964

State	Survey and detection						Control
	Surveyed			Positive specimens	Found infested ^{1/}		Acres treated (mechanical)
	Properties	Bushels gin trash	Acres		Properties	Acres	
Alabama	286	474	72	...	...	...	...
Arkansas	16,234	48,573	20	295	31	48,008	1,223,827
Florida	74	...	230	1,284	19	2,035	...
Georgia	...	1,534	...	...	...	...	...
Louisiana	4,000	12,244	1,031	1,299	148	25	122,577
Mississippi	2,918	7,311	...	...	...	...	...
North Carolina	104	...	...	...	...	...	...
Oklahoma	574	3,241	...	...	116	...	92,520
South Carolina	35	...	...	...	...	...	...
Tennessee	13	6,809	...	...	...	...	...
Texas	4,820	1,807	...	...	680	...	1,964,480
Total	29,058	81,993	1,353	2,878	994	50,068	3,403,404

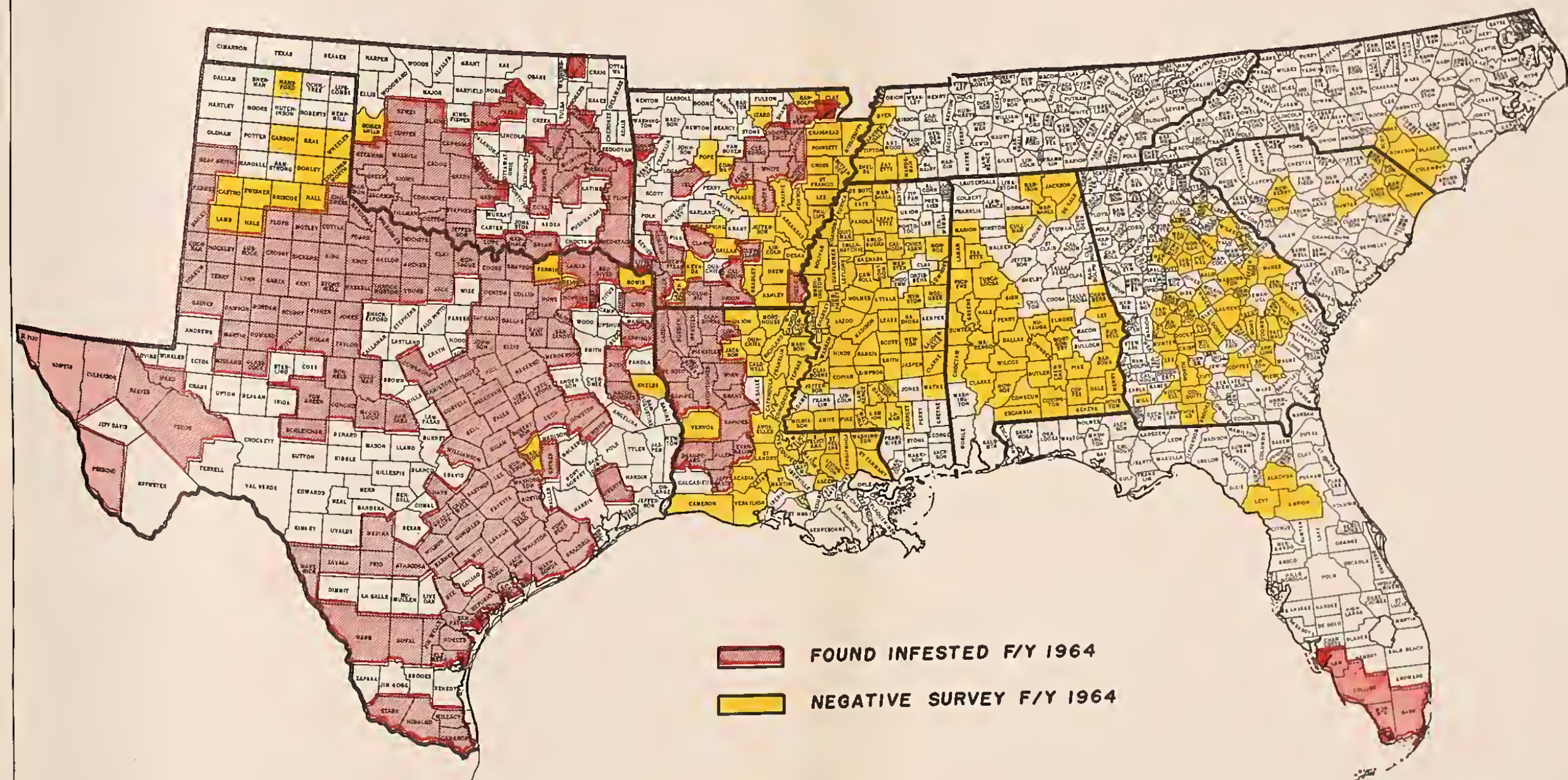
^{1/} Not necessary to report acres of infestation found within regulated area.

Table 26.--Pink Bollworm Program, Regulatory Activities, Fiscal Year 1964

State	Inspection for certification					Commodity lots treated			
	Properties	Processing plant visits	Shipping point visits	Industry site visits	Other	Fumigated	Heated	Other	Total
Alabama	...	...	...	...	...	1	...	...	1
Arkansas	262	2,899	1	17	835	496	3,893	...	4,389
Louisiana	206	1,708	8	6	2,371	46	884	19,053	19,983
Mississippi	...	...	...	...	...	1	...	...	1
Oklahoma	199	1,905	...	31	...	18	...	5	23
South Carolina	1	...	...	...	1	...	...	...	...
Tennessee	54	162	...	1	121	24	...	6	30
Texas	1,881	19,656	44	126	1,027	891	23	30	944
Total	2,603	26,330	53	181	4,355	1,477	4,800	19,094	25,371

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE - PLANT PEST CONTROL DIVISION
SOUTHERN REGION

PINK BOLLWORM





SWEETPOTATO WEEVIL

Despite the stepped-up activities that have been in operation on the Sweet-potato Weevil Program for the past two years, progress is not being made as rapidly as was hoped in all infested States; however, good progress is being made in some of the States.

In Alabama, infestations were found this year for the first time on three properties in Dale County, and Henry County was found to be reinfested. The infestive status in the commercial areas in southwest Alabama is definitely improved. The only spread of infestations in the State has been in dooryard plantings in some of the towns and cities.

In Florida, there is practically no change in the infestive status. The southern part of Florida is generally infested, and no effort has been made for a number of years to change this situation. The sweetpotato weevil work now is confined to the counties along the Alabama and Georgia lines and has been restricted to actions deemed essential to protect the neighboring States from contamination. Over the past two years this effort has met with remarkable success, and it is believed that recent changes in the Florida State Quarantine will further assist in this accomplishment. This year the infested properties in the generally infested area have been dropped. The figures representing infested properties did not present a realistic picture, since no survey has been made for a number of years. The south Florida area now is given the same status as the south Louisiana and south Texas areas.

The Georgia program has been consistently good. Excellent cooperation has been received from the State people, from the growers, and from industry; and it has been possible to continually reduce the number of infestations in the State and to clear a number of previously infested counties. During the 1964 fiscal year, 129 infested properties were released from quarantine, and only 30 additional infestations were found. Thus, at the close of the season, only 41 active infestations were known to exist in the State of Georgia, and surveys were negative in 19 counties. The indications are that the Georgia program is on a sound basis and real progress is being made.

In the State of Louisiana, new infestations were found during fiscal year 1964 in the eradication areas in East Feliciana, West Feliciana, and La Salle Parishes, and the number of properties in this area receiving eradication treatments increased from 303 in fiscal year 1963 to 410. The quantity of potatoes going to storage in the commercial areas was considerably reduced, indicating a change in the market for potatoes. A larger percentage of the crop is being sold as fresh potatoes and for canning than ever before.

In Mississippi, Jones County was found to be reinfested, and additional infestations were found in 11 counties previously known to support infestations of sweetpotato weevil. A larger percentage of the southern part of the State is now considered generally infested than the 1962 survey had indicated, and this has hindered the progress of the eradication program throughout the State.

The objective of the Sweetpotato Weevil Program in South Carolina is eradication of the weevil. Surveys of sweetpotato plantings and wild host plants were conducted in the Coastal Plains section of the State. Particular emphasis was given to survey in the infested counties of Charleston, Beaufort, and Jasper. There were no additional infestations found during the year in Jasper County. One area of infestation in which there had been negative inspection for three years was released from the State quarantine. South Carolina is one of the few States in which an active herbicide program is conducted in connection with the Sweetpotato Weevil Program. The herbicide 2,4-D, combined with an insecticide, is used to destroy wild host plants and to kill the weevil. Through the continuing use of this type of program, wild hosts have been greatly reduced and the sweetpotato weevil population has been cut to a bare survival level.

In Texas, the treating program, which was initiated in May 1963 under State and Federal supervision in the controlled counties of Anderson, Cherokee, Houston, Nacogdoches, Rusk, San Augustine, Shelby, and Trinity, was terminated in mid-August. The infested properties in these counties were given two treatments of 2 percent dieldrin dust at the rate of 40 pounds per acre. No commercial plantings were involved in this treatment. A fall survey of stored potatoes conducted by the Texas Department of Agriculture revealed 168 infestations in 9 counties. In fiscal year 1963, there were 85 infestations found in 8 counties. A warehouse treatment program was put in operation as in 1962, and warehouses in some 10 northeast Texas counties were treated with 10 percent DDT as a buffer measure. Spring field and bed treatments began in the infested counties in the control zone on April 20, 1964. Panola and Madison Counties were added to the list of counties treated in 1964, and Anderson County was deleted.



Dusting of field for control of sweetpotato weevil.

Table 27.--Sweetpotato Weevil Program, Survey and Control Activities, Fiscal Year 1964

State	Survey and detection					Control			
	Surveyed			Properties found infested	Properties released	Active infestations 6-30-64	Insecticide		Herbicide
	Properties	Bushels (potatoes)	Acres				Acres	Bushels (potatoes)	
Alabama	4,013	62,748	...	35	28	101	745	11,034	...
Arkansas	16	...	...	...	...	...	...	...	...
Florida	5	5	...	...	...	735 ¹ / ₂	15	520	...
Georgia	4,034	194,343	...	30	129	41	1,510	14,379	93
Louisiana	15,406	292,928	11,337	260	153	410	2,114	783,670	18
Mississippi	5,216	53,612	...	101	45	569	2	...	...
N. Carolina	90	7,110	...	...	...	...	...	...	...
S. Carolina	607	21,392	...	...	1	8	180	...	271
Texas	1,498	31,805	...	168 ² / ₂	...	168	453	...	...
Total	30,885	663,943	11,337	594	356	2,032	5,019	809,603	382
									20,715

¹/ All counties in Florida, except those bordering Alabama and Georgia, transferred to generally infested area (159 infestations).

²/ In Texas, farms are inspected, in the fall, in the counties in which sweetpotato weevil work is being conducted. Figures for number of infested properties are established each year, following the fall survey.

Table 28.--Sweetpotato Weevil Program, Regulatory Activities--Inspection for Certification
Fiscal Year 1964

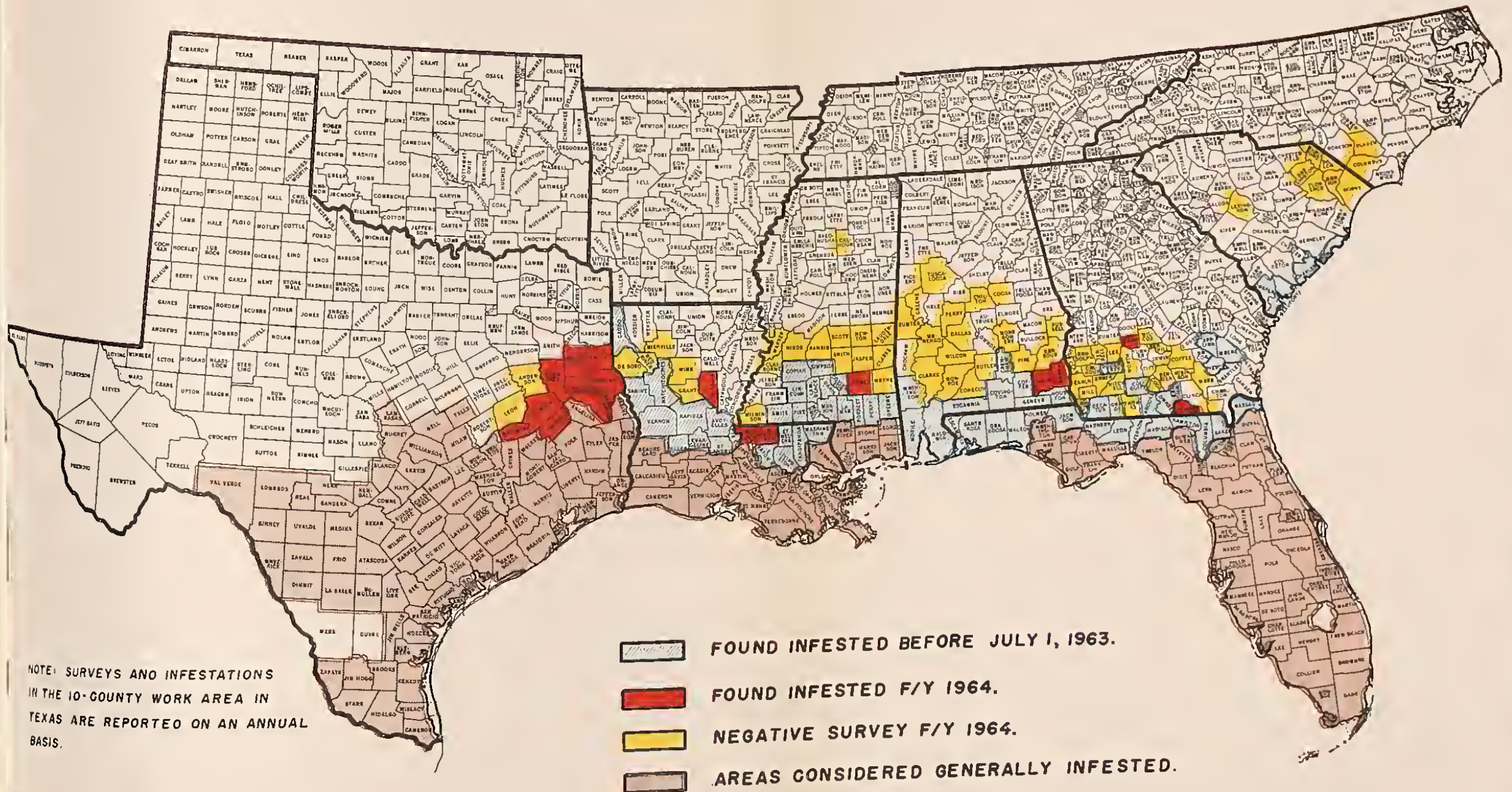
State	Inspection for certification					
	Properties	Acres		Processing plant visits	Industry site visits	Other
		Nursery	Other			
Alabama	2,641	...	...	8	...	89,521
Georgia	1	...	...	1	...	...
Louisiana	9,594	477	100,187	11,706	96	184,411
Total	12,236	477	100,187	11,715	96	273,932

Table 29.--Sweetpotato Weevil Program, Regulatory Activities--Certification and Commodity Treatment
Fiscal Year 1964

State	Acres treated for certification		Commodity lots treated				
	Soil	Foliage	Fumigated	Treated other methods			Total
				Transplants (seedbeds)	Other (storages)	Fruits and vegetables	
Alabama	...	...	600	151	55	48	854
Florida	...	...	...	2	...	...	2
Georgia	...	...	...	226	174	...	400
Louisiana	51	2	...	134	4,486	...	4,620
Mississippi	...	...	...	...	132	...	132
Texas	...	...	...	498	678	...	1,176
Total	51	2	600	1,011	5,525	48	7,184

UNITED STATES DEPARTMENT OF AGRICULTURE
 AGRICULTURAL RESEARCH SERVICE - PLANT PEST CONTROL DIVISION
 SOUTHERN REGION

SWEETPOTATO WEEVIL



NOTE: SURVEYS AND INFESTATIONS
 IN THE 10-COUNTY WORK AREA IN
 TEXAS ARE REPORTED ON AN ANNUAL
 BASIS.

WHITE-FRINGED BEETLE

The acreage infested with the white-fringed beetle is steadily increasing. It is encouraging that the additional acreage represents lands in the known infested States and, for the most part, does not involve areas far removed from previously recorded infested localities.

At the close of the 1964 fiscal year, 1,576,878 acres in 317 counties were shown as having been found infested in the States of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee. This represents a sizable land area; however, when all land area is considered in the above-named nine States, it is found that the white-fringed beetle occupies only 0.1 percent of it. Consequently, in addition to the noninfested States, there is much area remaining to be protected in the infested States.

For years, lack of available funds was the limiting factor in treating more land supporting beetle populations. Today this program is faced with additional problems. The restrictions placed on the use of chlorinated hydrocarbon insecticides hinder the complete treatment of many infestations. During the past year, resistance to dieldrin was found in isolated spots in south Alabama. The species which showed resistance is Graphognathus peregrinus. In view of this, all practicable effort was put forth to inspect nurseries and other areas where regulatory items are produced or stored. Proven inspectors were assigned the job of making larval inspections, which were carried on from the first of March through the middle of June. Immediately following the conclusion of the larval survey, teams were placed in the field to do adult inspection. Adult beetle populations found in the vicinity of nurseries or other regulatory areas are treated immediately with foliage sprays to prevent migration to those areas which previously have received a certification treatment through the incorporation of insecticide into the soil.

Because of the limitations placed on the use of the chlorinated materials and the appearance of resistance to dieldrin, work on the white-fringed beetle has been stepped up by the Methods Improvement laboratory. This program includes the testing of many materials, principally the phosphate insecticides, against the larval and adult forms. It also includes developing more regulatory treatments and testing the phytotoxicity of new varieties of ornamental plants. Technical malathion is proving to be an excellent insecticide against the adult. To suppress populations, as an adjunct to regulatory activities, planned foliage programs were in progress at the end of the fiscal year.

In addition to the control applied as an aid to regulatory measures, the White-fringed Beetle Program continues to emphasize treatment of outlying infestations. During 1964, treatment was completed on all recorded infested acreage in 28 counties. It was possible to treat again all known infested properties in Arkansas and South Carolina. Of the 317 counties infested with white-fringed beetle, all known infestations have been treated in 117 counties.



A peanut field heavily infested and severely damaged by white-fringed beetles.



This lima bean crop was a complete loss because of the ravages of white-fringed beetle larvae.

Table 30.--White-Fringed Beetle Program, Survey and Control Activities, Fiscal Year 1964

State	Survey and detection					Control		
	Surveyed		Found infested			Insecticide treatment (acres)		
	Properties	Acres ^{1/}	Properties	Acres	Counties	Ground	Air	Total
Alabama	10,952	...	854	30,618	3	21,769	...	21,769
Arkansas	4,889	...	262	2,108	...	2,023	2,239	4,262
Florida	5,834	...	460	15,970	5	...	...	...
Georgia	8,659	...	1,448	33,435	9	5,663	...	5,663
Louisiana	9,291	61,906	868	9,085	2	2,203	...	2,203
Mississippi	4,181	...	213	27,679	7	2,626	...	2,626
N. Carolina	42,539	...	873	12,254	6	5,988	...	5,988
Oklahoma	57	...	...	...	...	...	...	...
S. Carolina	9,818	...	99	1,180	3	1,180	...	1,180
Tennessee	38,065	...	284	8,527	2	4,610	1,096	5,706
Texas	101	...	...	...	...	...	...	...
Total	134,386	61,906	5,361	140,856	37	46,062	3,335	49,397

^{1/} The reporting of acres surveyed on White-Fringed Beetle Program is optional (by state).

Table 31.--White-Fringed Beetle Program, Regulatory Activities--Inspection for Certification
Fiscal Year 1964

State	Inspection for certification						
	Properties	Acres		Processing plant visits	Shipping point visits	Industry site visits	Other
		Nursery	Other				
Alabama	1,825	13,076	9,628	92	301	226	1,637
Arkansas	10	...	1	...	2	...	62
Florida	1,020	1,100	239	34	795	286	212
Georgia	1,170	1,792	5,144	143	177	172	278
Louisiana	228	3,012	23	...	2	6	44
Mississippi	1,067	2,533	2,334	15	81	428	148
North Carolina	255	842	505	106	240	120	16
South Carolina	7	34	1	...	...	1	...
Tennessee	288	5,360	666	7	69	150	371
Total	5,870	27,749	18,541	397	1,667	1,389	2,768

Table 32.--White-Fringed Beetle Program, Regulatory Activities--Certification and Commodity Treatment
Fiscal Year 1964

State	Acres treated for certification		Commodity lots treated					
	Soil	Foliage	Fumigated	Dipped	Soaked	Heated	Other	Total
Alabama	5,851	2,512	78	14,709	6,493	2,355	4,940	28,575
Arkansas	63	102	17	...	...	...	50	67
Florida	908	329	1	...	...	...	13	14
Georgia	1,291	...	232	527	...	51	816	1,626
Louisiana	2,476	270	5	8	1	...	8	22
Mississippi	1,970	32	169	73	...	...	10,929	11,171
North Carolina	447	...	189	62	13	...	107	371
South Carolina	30	...	2	...	2	...	8	12
Tennessee	786	4	40	2	11	11	98	162
Total	13,822	3,249	733	15,381	6,520	2,417	16,969	42,020

Table 33.--White-Fringed Beetle Program, Regulatory Activities--Commodities Treated
Fiscal Year 1964

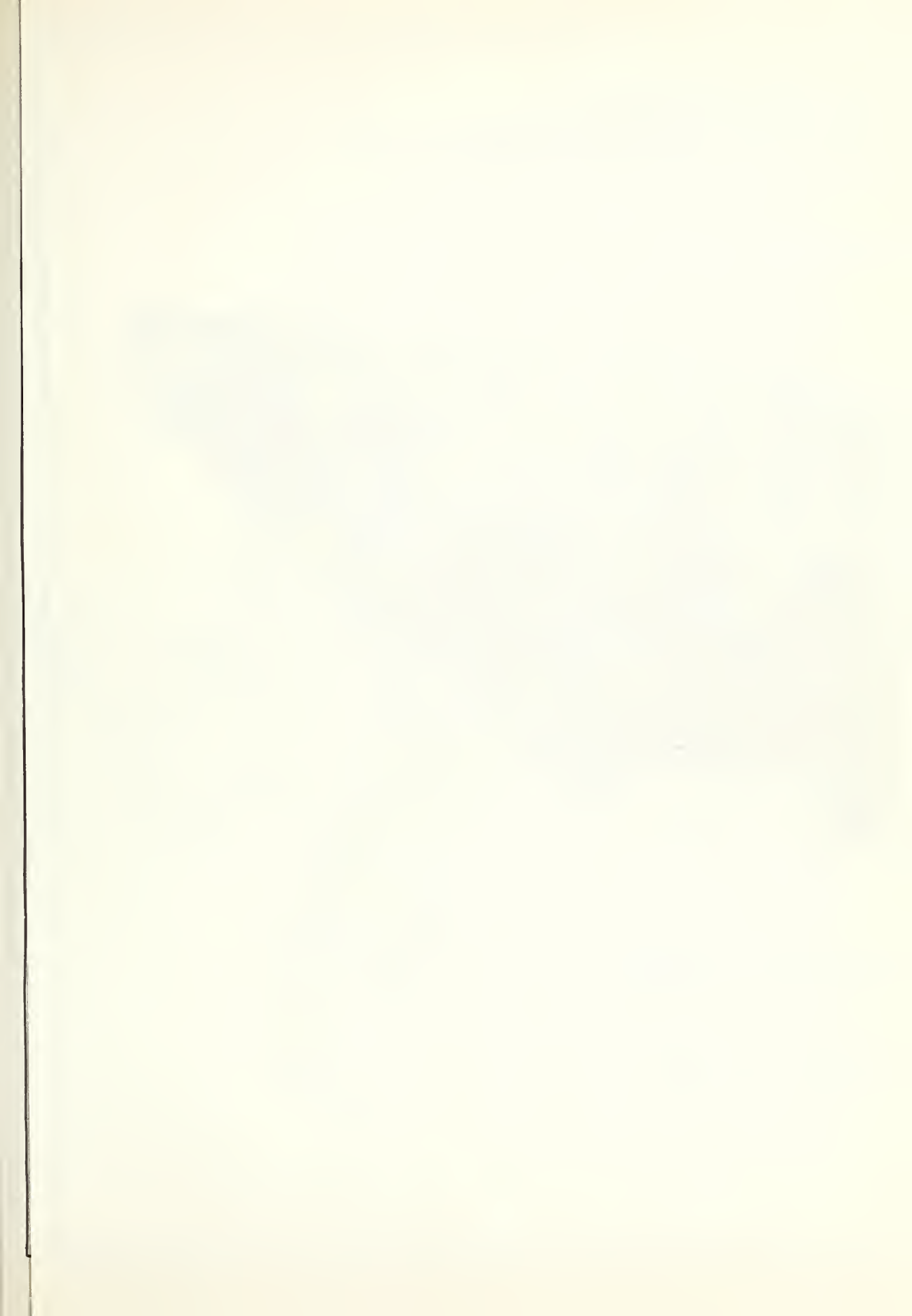
Commodities	Lots treated									
	Ala.	Ark.	Fla.	Ga.	La.	Miss.	N. C.	S. C.	Tenn.	Total
Fruits and Vegetables	50	...	...	...	...	1	...	...	...	51
Nursery Stock	21,198	...	4	400	15	97	80	2	68	21,864
Grain	...	17	...	...	...	...	...	...	...	17
Cotton Products	...	...	...	...	...	1	...	...	...	1
Soil	2,383	...	10	441	7	167	225	2	61	3,296
Transplants	4	...	...	1	...	...	10	...	12	27
Machinery and Equipment	4,932	50	...	658	...	10,904	55	8	12	16,619
Other	8	...	...	126	...	1	1	...	9	145
Total	28,575	67	14	1,626	22	11,171	371	12	162	42,020

Table 34.--Status of White-Fringed Beetle Program, June 30, 1964

State	Estimated acres found infested from beginning of program ^{1/}	Estimated infested acres treated, treatment still effective ^{2/}	Estimated infested acres remaining to be treated	Number counties	
				Found infested from beginning of program	All known infestations treated
Alabama	370,011	141,791	228,220	46	10
Arkansas	8,640	8,610	30	6	4
Florida	160,048	51,163	108,885	14	...
Georgia	476,833	98,911	377,922	94	21
Louisiana	74,517	28,839	45,678	18	3
Mississippi	308,219	18,447	289,772	60	16
N. Carolina	70,706	43,869	26,837	38	29
S. Carolina	8,544	8,544	...	15	15
Tennessee	99,360	40,813	58,547	26	19
Total	1,576,878	440,987	1,135,891	317	117

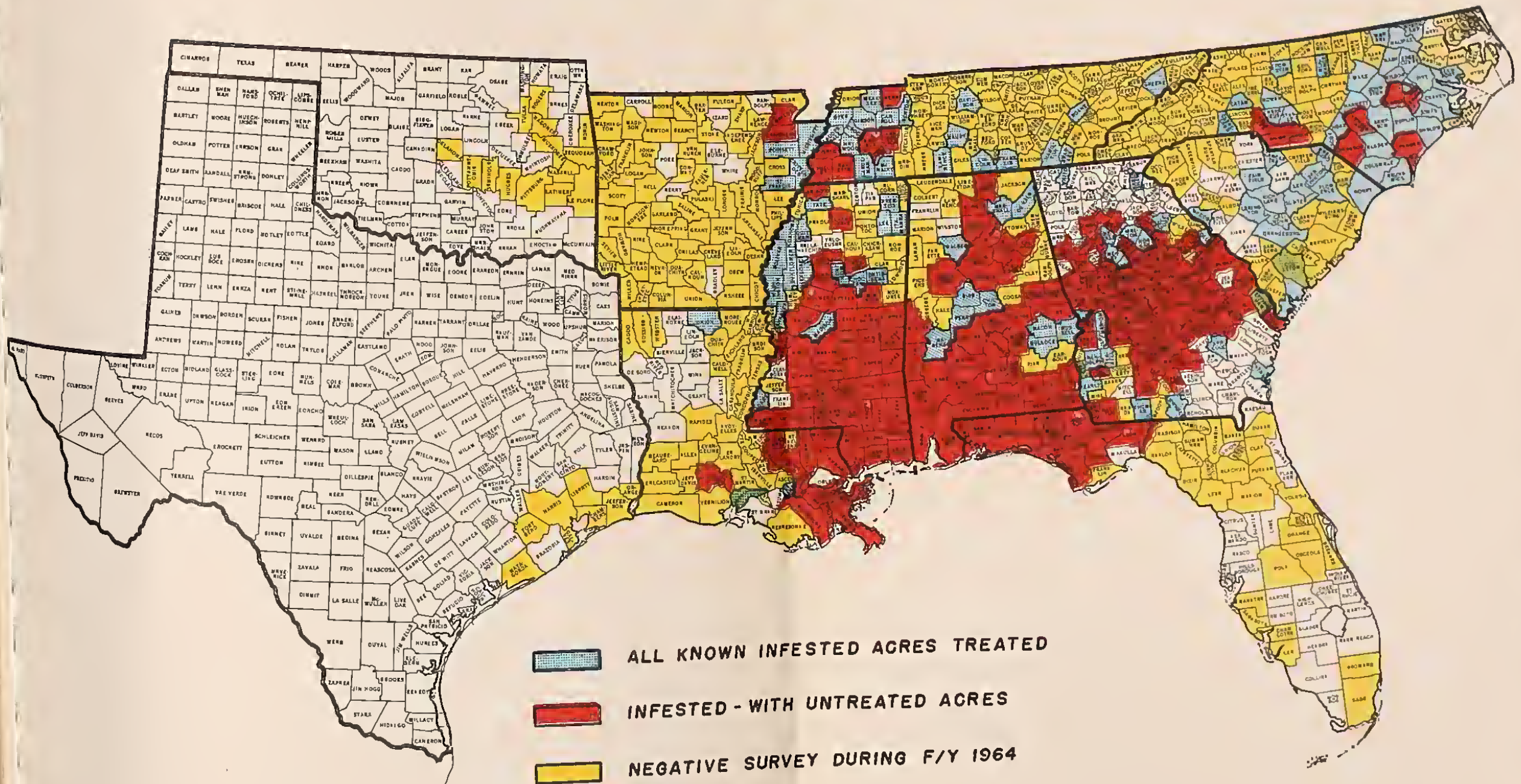
^{1/} Includes some acreage on which infestation apparently has been eradicated.

^{2/} Does not include buffer zone, retreatment, or precautionary treatment of noninfested land.



UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE - PLANT PEST CONTROL DIVISION
SOUTHERN REGION

WHITE - FRINGED BEETLE



WITCHWEED

Witchweed is a threat to the five-billion-dollar corn, sorghum, and sugarcane crops in the United States. Witchweed was first identified in 1956 as the cause of corn plants wilting, yellowing, and dying in the Carolinas. Many farmers had experienced complete crop loss. The control program has gradually restored corn production in the infested area. Prompt and effective quarantine action has prevented distant spread.

The continuing objective of the witchweed program is to suppress the infestation by cultural and chemical treatments and to prevent further spread from the known infested areas.

While witchweed has been found on additional farms each year since 1956, fewer new infestations were detected during the 1963 season than in any previous year. Infestations were found for the first time in Lee, Craven, and Onslow Counties, North Carolina. No new counties were found infested in South Carolina. At present, the contiguous area of witchweed is restricted to 24 counties in North Carolina and 10 counties in South Carolina. These are coastal plain counties.

Spraying emerged witchweed plants with 2,4-D is the principal method of control. This spraying kills the witchweed plant and prevents further seed production. All known infested land, where host crops of witchweed are present and where crops susceptible to 2,4-D damage are not involved, is sprayed one or more times.

All spraying is under contract. Each year the contract cost has decreased. Because of the extremely low toxicity of 2,4-D, no adverse effects to handlers, applicators, or crops have occurred. This year 460,882 aggregate acres in North Carolina and South Carolina received the 2,4-D treatments. Ground power and manual sprayers were used exclusively.

The control program has restored corn production in the infested area where complete corn crop losses were experienced early in the program; now only occasional damage is found. During the 1963 season no witchweed was found in 1,551 previously infested fields. Many fields required only one application of 2,4-D for control throughout the season.

Farmers are cooperating in the control program by planting crops tolerant to 2,4-D in infested fields. When susceptible crops must be planted in required crop rotation, preplant herbicides are used by the farmers. Early harvest and prompt disking have destroyed witchweed in fields where 2,4-D or other herbicides could not be used.

At the outer area, infestations are often small in size. A method of soil fumigation has been developed that shows promise of witchweed eradication. The fumigant (methyl bromide) is applied with chisel applicators and the land is covered with a durable lightweight polyethylene. Field tests show complete witchweed seed mortality. Field fumigation was pushed this year and techniques were developed to treat and tarp an acre in a continuous operation.

More than 29 different farm crops are grown in the witchweed area. Tobacco, cotton, corn, soybeans, peanuts, small grains, and sweetpotatoes are the most important cash crops. Each crop has been studied from planting to harvesting to be sure that witchweed is not spread by any of the operations involved. Certificates and limited permits authorize the safe farm-to-market movement from infested farms. It takes careful supervision at approximately 240 processing plants to handle the spring and fall harvests. These designated processing plants are under signed agreements to follow procedures proven to free crops of witchweed.

Fumigation, water under high pressure, heat treatments, and steam cleaning are some of the methods used to treat farm machinery, construction equipment, crates, bags, boxes, etc., being moved from areas infested with witchweed. The search for more effective, quicker, and more economical methods of freeing farmland of witchweed continues at the Whiteville, North Carolina, Methods Improvement Laboratory and at the Dillon, South Carolina, test farm.



Cornfield heavily infested with witchweed. Complete loss of corn crop in infested portion of field.

In photograph at right, note in background normal growth of corn in uninfested portion of same field. (Photographs made on same day)



Table 35.--Witchweed Program, Survey and Control Activities, Fiscal Year 1964

State	Survey and detection				Control	
	Surveyed		Found infested		Properties	Acres treated
	Properties	Acres	Properties	Acres		
Alabama	2,667	70,196	...	...	...	...
Arkansas	591	9,068	...	...	...	...
Florida	743	13,771	...	...	...	...
Georgia	712	7,250	...	...	...	...
Louisiana	5,536	36,030	...	...	...	...
Mississippi	1,224	21,600	...	...	...	...
North Carolina	57,591	627,540	698	24,962	16,452	357,647
Oklahoma	156	3,394	...	...	...	...
South Carolina	19,288	257,348	136	1,660	1,759	103,235
Tennessee	2,132	29,366	...	...	...	...
Texas	1,283	21,552	...	...	...	...
Total	91,923	1,097,115	834	26,622	18,211	460,882

Table 36.--Witchweed Program, Regulatory Activities, Fiscal Year 1964

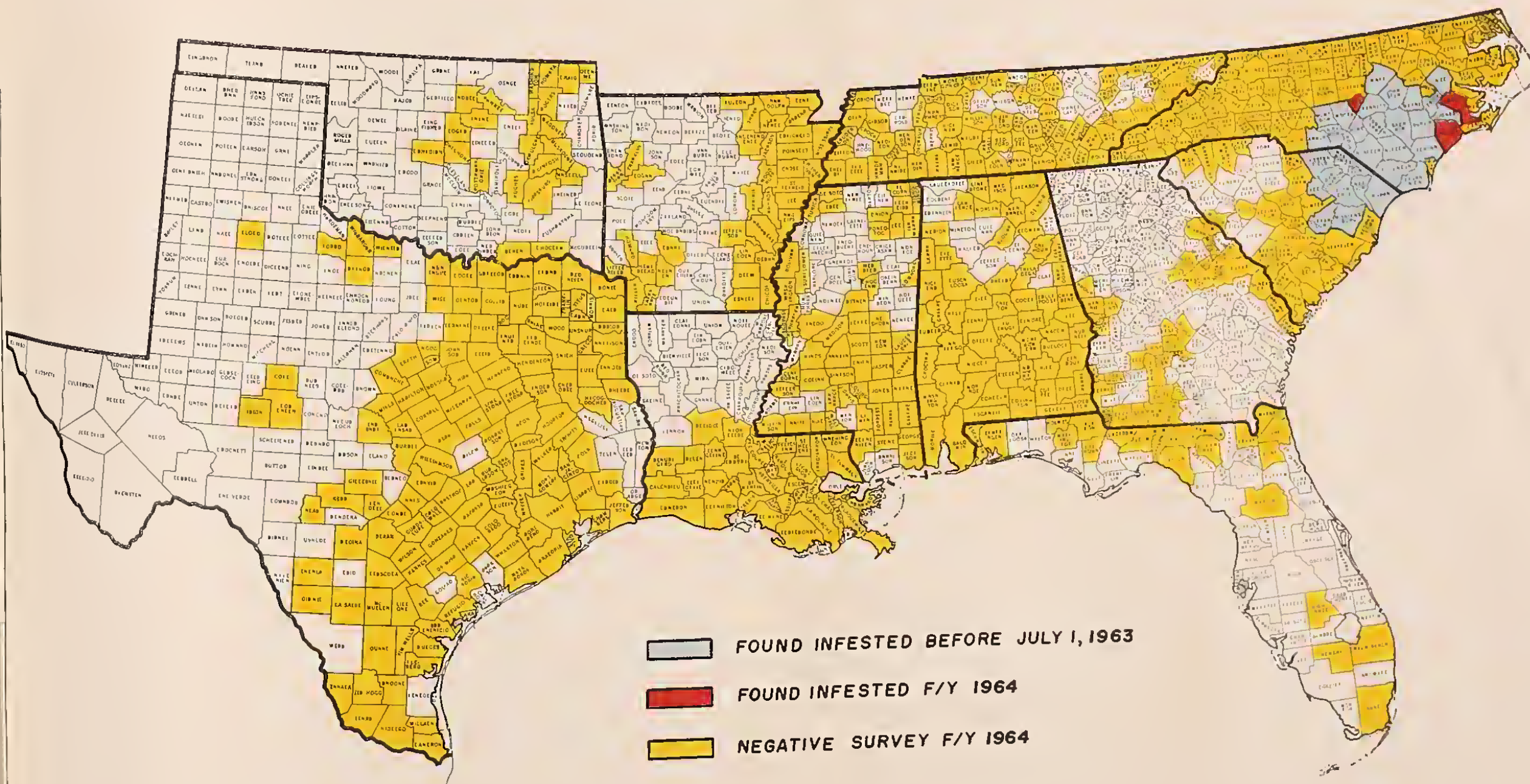
State	Inspection for certification						Commodity lots treated			
	Properties	Acres		Processing plant visits	Shipping point visits	Industry site visits	Fumigated	Dipped	Other	Total
		Nursery	Other							
North Carolina	5,011	555	44,853	26,608	1,471	635	1,236	...	2,597	3,833
South Carolina	419	20	6,185	42	17	6	2,149	...	538	2,687
Total	5,430	575	51,038	26,650	1,488	641	3,385	...	3,135	6,520

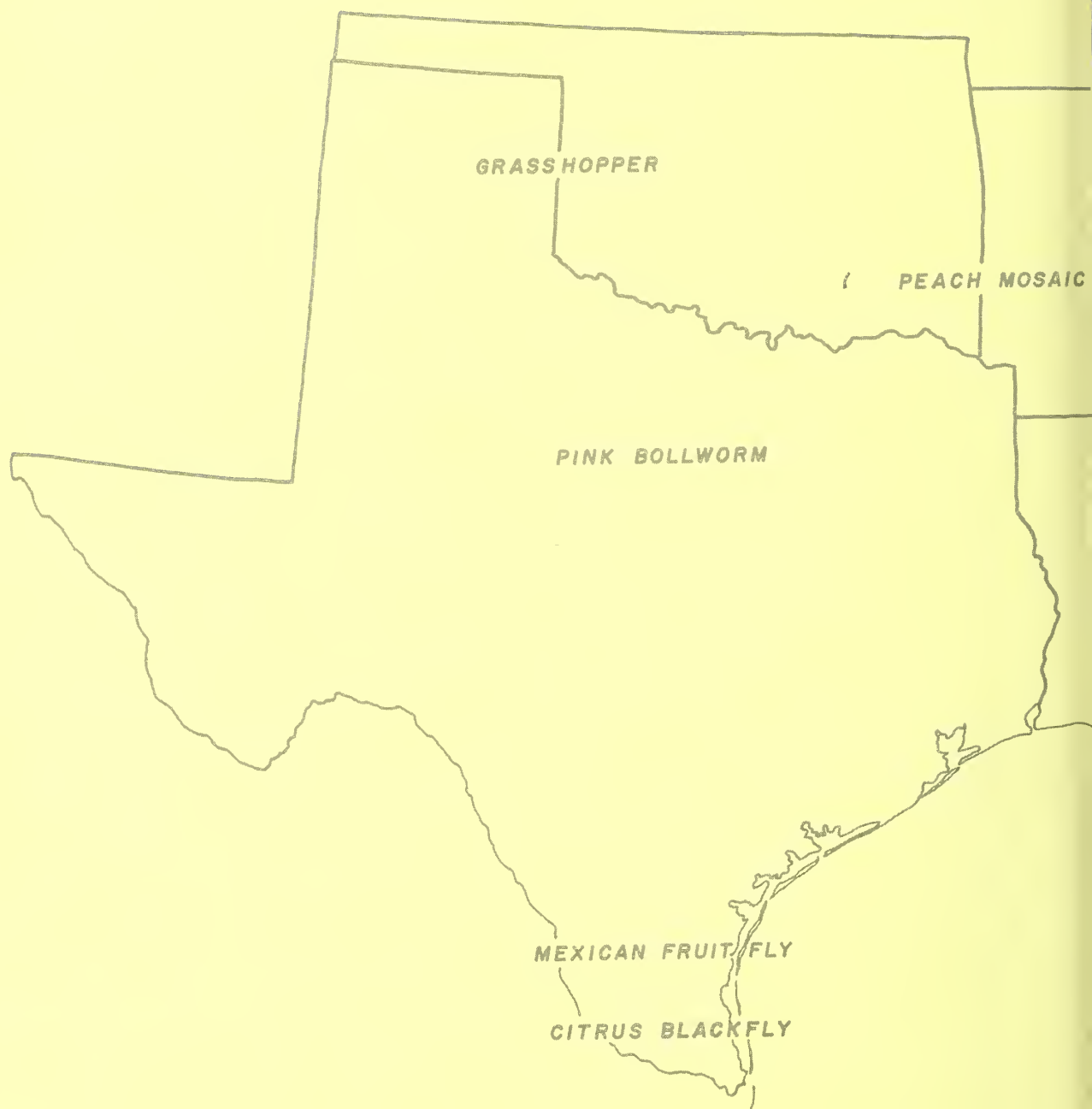
Table 37.--Witchweed Program, Regulatory Activities--Commodities Treated
Fiscal Year 1964

Commodities	Lots treated		
	North Carolina	South Carolina	Total
Fruits and Vegetables	897	...	897
Grain	373	2	375
Cotton Products	10	17	27
Soil	736	2,043	2,779
Transplants	470	...	470
Machinery and Equipment	1,061	621	1,682
Other	286	4	290
Total	3,833	2,687	6,520

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE - PLANT PEST CONTROL DIVISION
SOUTHERN REGION

WITCHWEED





GRASSHOPPER

PEACH MOSAIC

PINK BOLLWORM

MEXICAN FRUIT FLY

CITRUS BLACKFLY

PLANT PEST CONTROL
COOPERATIVE PROGRAMS

WESTERN REGION

FISCAL YEAR

1964

PLANT PEST CONTROL

COOPERATIVE

PROGRAMS



FISCAL YEAR

1964

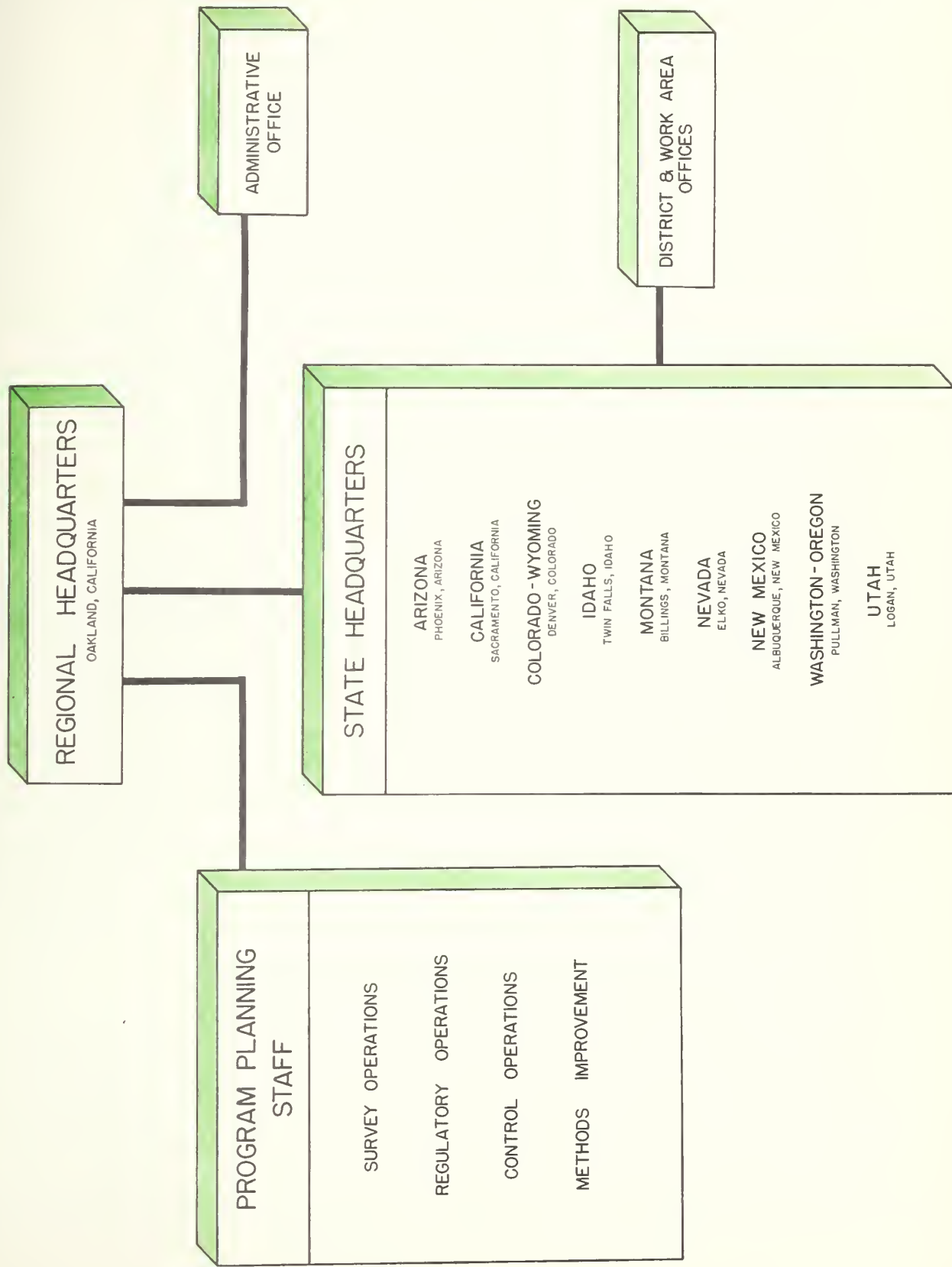
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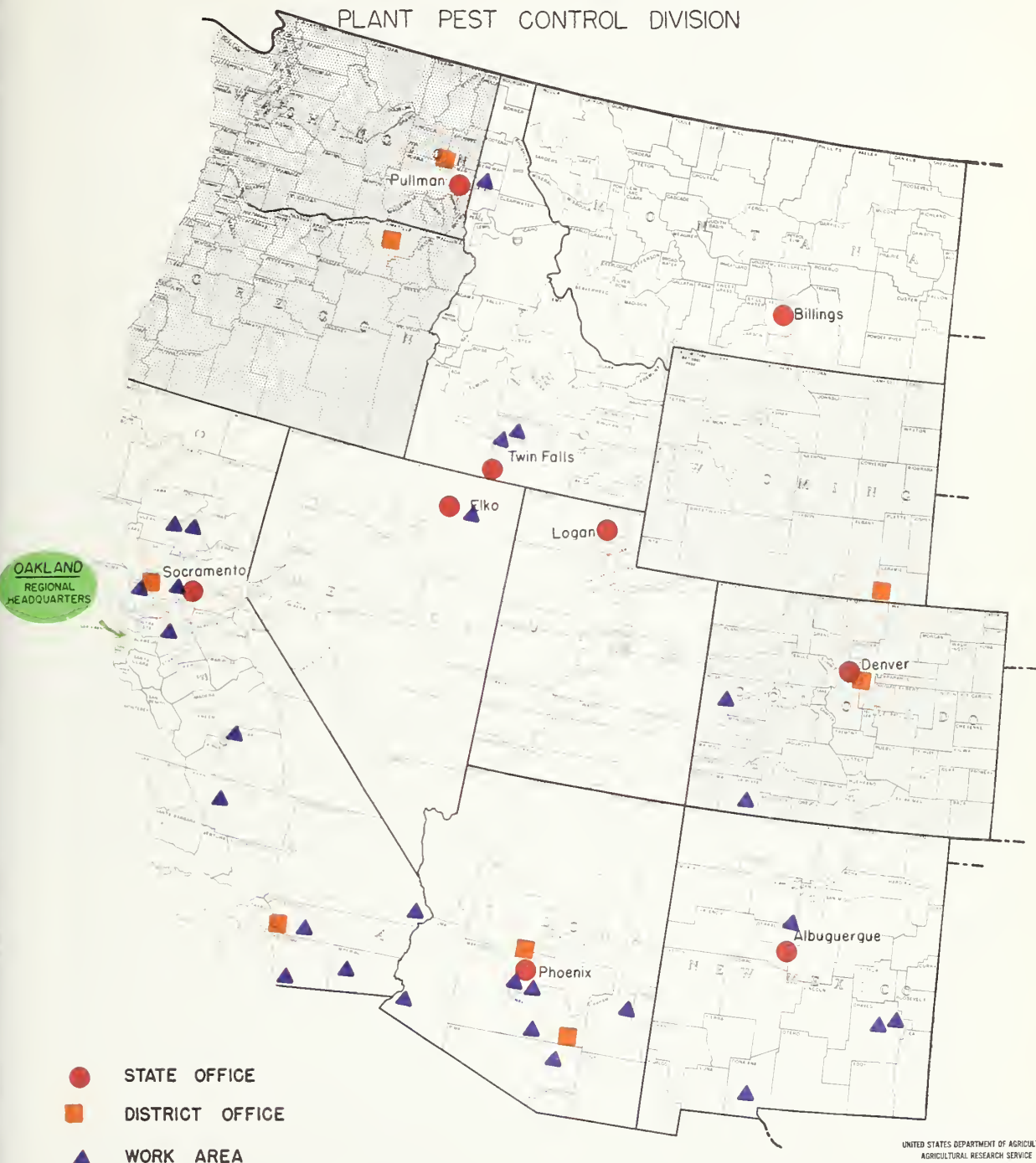
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WESTERN PLANT PEST CONTROL REGION



WESTERN REGION

PLANT PEST CONTROL DIVISION



UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION
JUNE 30, 1964

Plant Pest Control Cooperative Programs

The pictures which illustrate this report portray the changes which have marked the work of the Division in the Western Region. --The old versus the new. The year 1964 has seen progressive replacement of old tools and the adoption of new methods to accomplish the work. The reader will perceive these changes.

A new state, Hawaii, has been added to the Western Region. The Division's work there is somewhat different from that elsewhere, and a full account of it is given later in this report.

Continued progress was made toward the eradication of several of the pests with which this Region is concerned, but ground was lost in some other areas.

Hall Scale Eradication - No infestations in addition to those found and removed in fiscal year 1963 have been located.

Japanese Beetle Eradication - Eradication measures taken by the Division and its cooperators in the Sacramento area thus far appear to have been successful. No true specimens have been collected there since June 18, 1962. All portions of the eradication area and environs have been heavily trapped and numerous visual inspections made, all with negative results.

Khapra Beetle Eradication - Four properties in the Yuma, Arizona, area were found infested with these insects during March 1964. They were the first in the Region in nearly 2 years. The properties involved were promptly fumigated. At the end of the fiscal year there were no known occurrences of the beetle in the Western Region.

Several ships offloaded commodities at various west coast ports before the vessels were found to be khapra beetle infested. The offloaded, exposed materials were traced down, and proper treatment was administered.

Pink Bollworm Eradication - Despite professional advice to the contrary, a minority group of Arizona private cooperators decided that "substantial eradication" had been achieved. They successfully urged the State Commission of Agriculture and Horticulture to relax many of the recommended eradication restrictions, including the prohibition against growing stub cotton. This withdrawal of support altered the Division's position, and a program of survey, with emphasis on western Arizona, adjacent to uninfested California, ensued. This activity, plus discharge of its Regulatory responsibilities, comprised the Division's participation in the program. The resumption of the practice of stubbing cotton invited a resurgence of pink bollworm populations. Present indications are that the pest is accepting the invitation.

Sex-lure traps were used in Arizona again this year, and in greater numbers in the western cotton-growing areas, in an effort to detect and to delineate the distribution pattern of the pest. No moths had been caught by June 30, 1964.

Peach Mosaic Eradication - This program was continued at about the same pace as during the previous fiscal year. A Colorado peach grower operating in the peach mosaic-infected area sent a quantity of budwood to an Oregon nursery, thus exposing noninfected areas. Surveys were made in an attempt to determine whether peach mosaic disease had been transmitted by the buds. So far as is known at this time, it was not transmitted. Additional inspections will be made, and tests are being run to determine whether the parent trees harbored the disease without showing symptoms.

Cooperative Economic Insect Survey - One state canceled its cooperative survey agreement with the Division. Six states in the Western Region maintain active agreements. All but one of those without agreements submit reports regularly through the survey coordinator.

Burrowing Nematode - A comprehensive cooperative survey was made in California to determine the incidence of this pest. Citrus and avocado orchards and nurseries were surveyed. Burrowing nematodes were found only in 36 nurseries, and they were usually associated with Anthurium sp.

Fruit Flies - A total of 46 Mexican fruit flies was trapped in Nogales, Arizona, between July 9 and December 10, 1963. These were apparently carried to the Border in fruit from lower Mexico, because no larval forms were found to suggest that there was an established infestation in the vicinity of fly capture.

To protect southern California from becoming infested by Mexican fruit flies, Entomology Research, the Division, and their cooperators initiated a program for the release of sterile male flies in the Tijuana, Baja California, area. This has been successful to date, and the spraying program formerly conducted has been suspended.

Beet Leafhopper - Surveys were continued in the spring-breeding areas in the Southwest. A cooperative spray program to control these insects on BLM lands in Idaho was again necessary in 1964. Technical Malathion was used as the insecticide, and after preliminary tests were made it was determined to treat the infested area at the rate of one-half pint of undiluted material per acre. The results were good. The acreage treated was 11,344.

Cotton Weevil - Distribution of a weevil infesting cotton in Arizona is being determined by intensive surveys. There are indications that stub cotton may have a major part in supplying hibernation quarters for this pest, making it possible for it to overwinter in desert cotton areas of the Southwest. Surveys warrant the interim presumption that the weevils are rather generally distributed in cotton in Santa Cruz, Pima, Pinal, and Yuma Counties. Continuing surveys will clarify this.

Grasshopper Control - Significant in this season's program was the almost exclusive use of technical Malathion applied by specially equipped and carefully calibrated aircraft at the approximate rate of one-half pint per acre. In nearly all cases circumstances permitted proper application, and results were satisfactory. In a few areas the deleterious side effect of commercial bee losses, incurred when the bees worked recently-sprayed range, alerted us to the necessity for taking the fullest precautions against such exposures. Nearly a million acres of rangeland were treated. Drouth conditions continued to be severe in parts of Colorado and New Mexico. For the third successive year, grasshoppers were no problem in these historic 'hopper trouble areas.

Barberry



Barberry Eradication

Cooperative barberry eradication continues as an active program in the States of Washington and Colorado. Montana and Wyoming have been on maintenance for the past several years. Barberry nursery inspections are made each year in the States of California, Oregon, Washington, Montana, Colorado, and Utah.

Reconnaissance surveys in Fergus and Madison Counties, Montana, resulted in the discovery of many escape bushes. This condition has been called to the attention of the State Commissioner of Agriculture and the State Horticulturist. State funds are being requested by the Commissioner of Agriculture to reactivate the cooperative barberry eradication program in the above counties. If these funds are appropriated, they will become available July 1, 1965.

In the State of Washington, the major accomplishment in barberry eradication during the year was the completion of the second rework survey of Spokane Valley and the City of Spokane, including environs areas. The entire territory comprised over a hundred square miles, with most of it comprising closely-grouped urban and suburban residence areas.

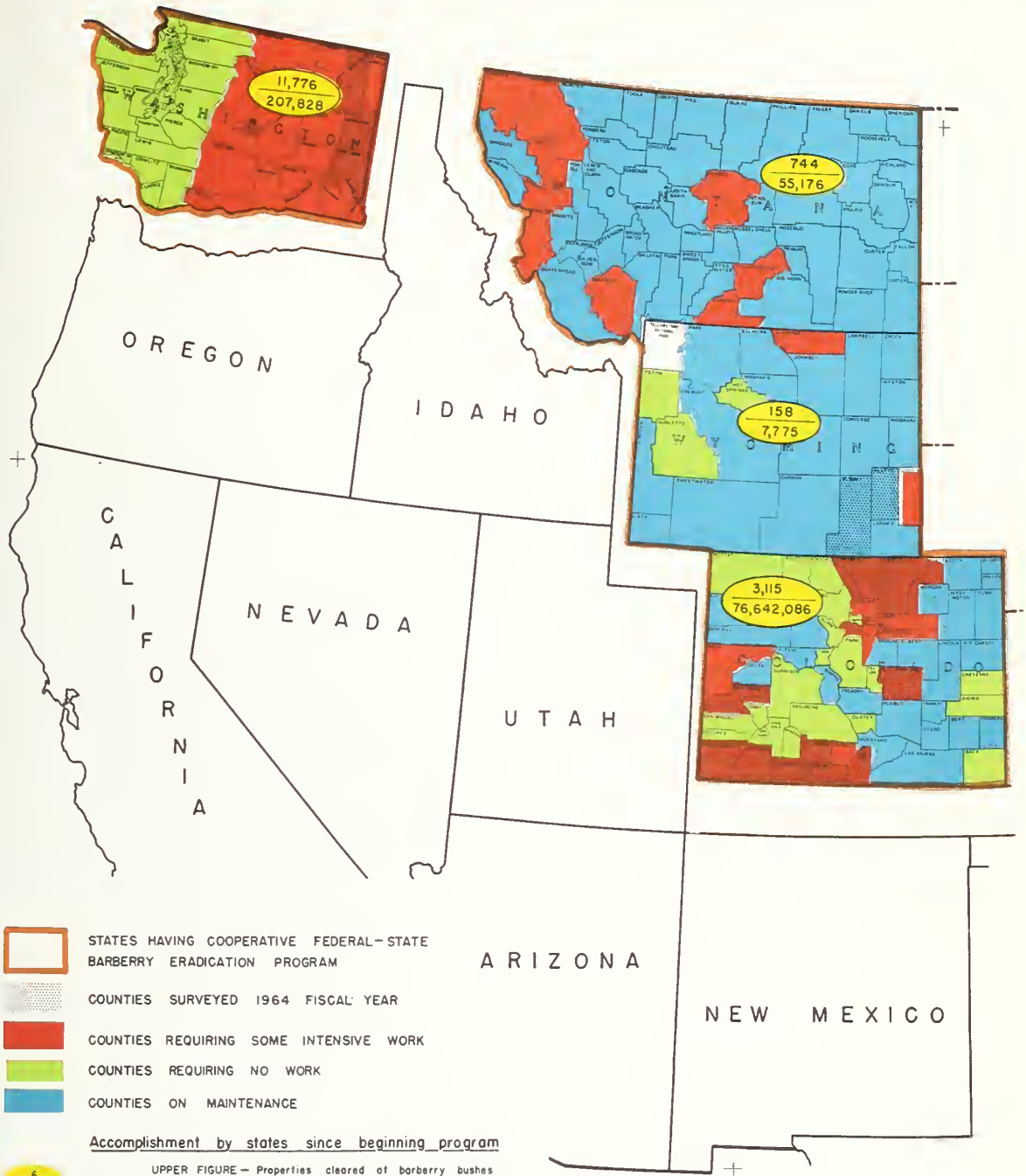
Good progress is being made toward the eventual elimination of rust-susceptible barberry in this sizeable area. This is well demonstrated in the City of Spokane where only 144 new properties with a total of 346 bushes were found on the recently completed survey. This is an unusually favorable position compared to the 5,000 infested properties and 50,000 bushes destroyed on the initial survey in 1947. An additional 1,180 bushes destroyed on old properties gives a total of only 1,526 bushes destroyed in the City on the second rework survey. This represents about 2 percent of the total bushes destroyed on the initial survey in 1947-48. Further evidence of the good control being attained is that of the total of 6,822 old infested properties located on the initial and first rework survey, only 468, or less than 7 percent, were reinfested on the second rework survey, and many of these were new properties found on the first rework survey.

Seven counties in southwestern Colorado (Archuleta, Conejos, Costilla, Dolores, La Plata, Montezuma, and Rio Grande) were originally heavily infested with native barberry, Berberis fendleri. Initial surveys here are nearly complete, and rework during the year was in operation in parts of Archuleta, La Plata, Montezuma, and Rio Grande Counties surveyed at least three years ago. A total of 50 square miles involving 274 properties was inspected, where 54,670 bushes were destroyed; 35 properties were inactivated for future organized inspection on the basis of two successive negative checks involving a 3-year interval or more between final

inspections. All other remaining infested areas in Colorado were inspected for introduced barberry, Berberis vulgaris, and its horticultural varieties. All territory is on a rework basis. During the year a 15-square mile area was inspected for rust susceptible barberry in 4 counties; 18 old and 8 new properties were found infested; 20 properties were inactivated on the basis of 2 successive negative inspections with at least a 3-year interval.

Stem and leaf rust losses for the year in the States of Montana, Colorado, Wyoming, and Washington ranged from zero to a trace.

BARBERRY ERADICATION



STATES HAVING COOPERATIVE FEDERAL-STATE BARBERRY ERADICATION PROGRAM

COUNTIES SURVEYED 1964 FISCAL YEAR

COUNTIES REQUIRING SOME INTENSIVE WORK

COUNTIES REQUIRING NO WORK

COUNTIES ON MAINTENANCE

Accomplishment by states since beginning program

UPPER FIGURE - Properties cleared of barberry bushes

LOWER FIGURE - Barberry bushes and seedlings destroyed

Summary of accomplishments all states Western Region

PROPERTIES CLEARED	15,793
BUSHES & SEEDLINGS DESTROYED	76,912,865

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION
AUGUST 12, 1964



PRESENT STATUS, PROGRESS, AND FUTURE REQUIREMENTS, 1918 - 1964

Program Barberry

Fiscal Year 1964

State	S Q U A R E M I L E S								P R O P E R T I E S			B A R B E R R Y B U S H E S D E S T R O Y E D		
	Total in State to be Worked	Number Covered		Number Requiring Work One or More Times				Total Found To Date	Number Requiring One or More Reinspections	Number Completed	Common	Native	Total	
				Farm- stead		Inten- sive								
				Initial	Rework	Initial	Rework							
Colo.	74,685	74,685	20,330	0	0	0	185	74,500	560	2,555	104,104	76,537.982	76,642.086	
Mont.	146,316	146,316	7,235	0	0	0	27	146,289	48	696	55,176	-	55,176	
Wash.	29,872	29,872	4,893	0	0	54	882	28,936	11,317	459	207,828	-	207,828	
Wyo.	94,492	94,492	9,126	0	0	0	14	94,478	5	153	7,775	-	7,775	
TOTALS	345,365	345,365	41,584	0	0	54	1,108	344,203	11,930	3,863	374,883	76,537,982	76,912.865	

BARBERRY ERADICATION WORK ACCOMPLISHMENT

Program Barberry

Fiscal Year 1964

State	Square Miles Worked		Properties Found Infested		Old Properties Inspected	Properties Inactivated	Bushes Destroyed		Inspections	
	Initial	Rework	New	Old			Common	Native	Nursery	Dealer
Colorado	0	65	9	161	499	55	1,277	54,670	10	1
Montana	0	0	0	0	0	0	0	0	5	1
Oregon	-	-	-	-	-	-	-	-	48	3
Utah	-	-	-	-	-	-	-	-	7	0
Washington	0	105	92	253	3,033	0	3,599	-	22	2*
Wyoming	0	3	0	0	6	0	0	-	-	-
TOTALS	0	173	101	414	3,538	55	4,876	54,670	92	7

*2 seed sources inspected

ASSOCIATED ACTIVITY REPORT

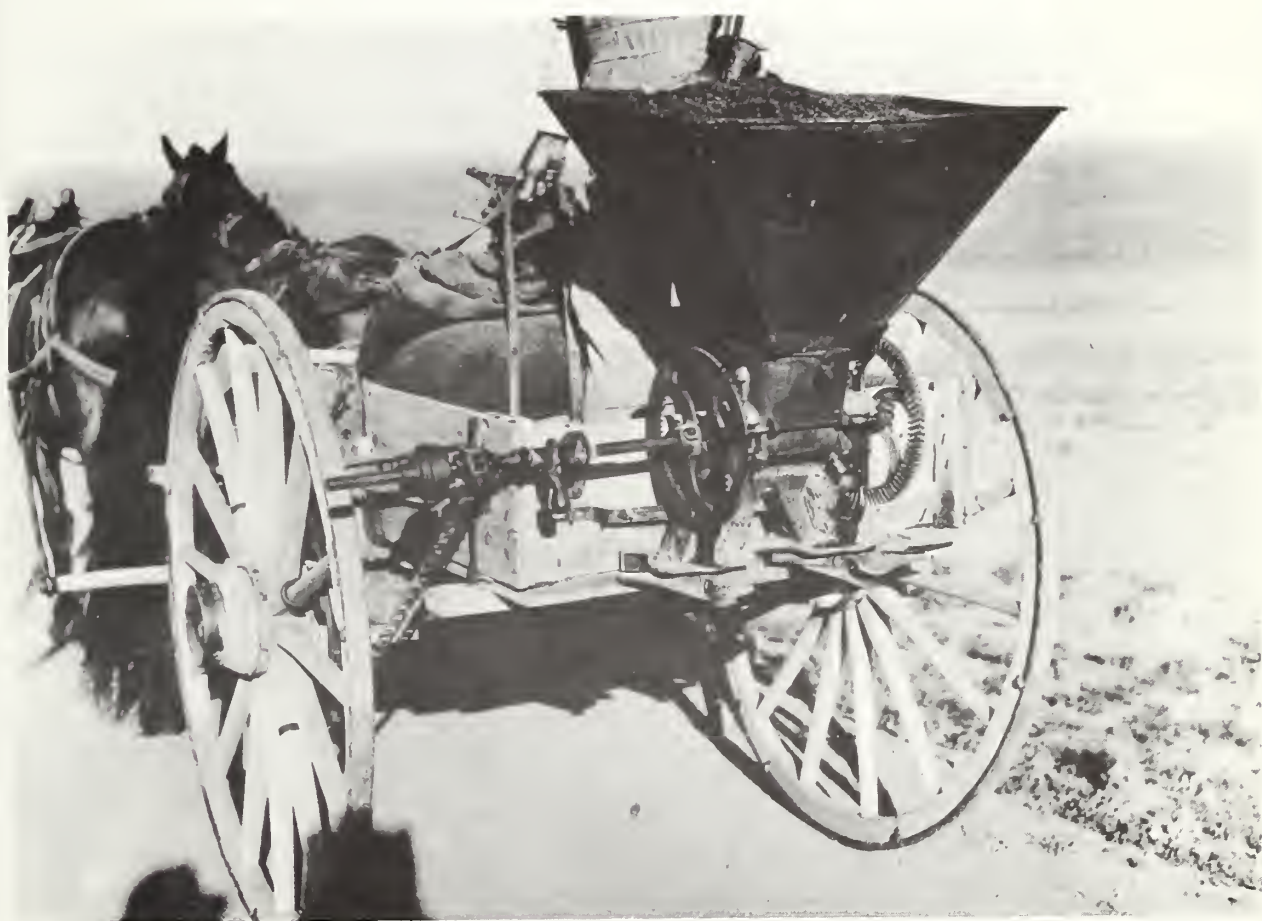
WESTERN REGION

PROGRAM Barberry

FISCAL YEAR 1964

STATE	PUBLIC MEETINGS ATTENDED	PRESENTATIONS					EXTENT THESE AIDS WERE USED				SPECIAL REPORTS	MAN-HOURS OF TECHNICAL ASSISTANCE
		TALKS	SLIDES	FILMS	RADIO	TV	FEATURE & NEWS STORIES	EXHIBITS	BUL.	CIR.	INFEST. MAPS & POSTERS	
Arizona								1		1,575		10
Colorado									182	78		5
Oregon												
Utah									775	324		
Washington							2			250	3	
TOTAL							2	1	957	2,227	3	15

Grasshopper



Grasshopper Control

About a million acres were cooperatively treated for grasshopper control during the 1964 field season. More than half of the total acreage was in Idaho, with lesser amounts being sprayed in Wyoming, Montana, Arizona, and California. As a result of the experimental spraying of 1963, technical Malathion was the insecticide used in nearly all programs this season. It was applied without dilution at the rate of one-half pint per acre. Even further reduction in Malathion dosage may be possible next year. Six-ounce-per-acre dosage trials were run in Idaho late in the season, and results were promising enough that early season trials will be worked into control blocks next spring, if indicated results persist. Some work done with turbines in Arizona was at the same rate for technical Malathion, but with one-half pint of cycle oil and 3 pints of fuel oil added. Thus, one-half gallon of solution was applied per acre.

In California the insecticide Sevin was used on 1,820 acres, and baits were applied on 380 acres.

In all cases where application was satisfactorily made, the results were good.

Most of the rangelands in the Western Region are federally owned and managed. Because of this circumstance, much of the rangeland grasshopper control work in the Region is done on Federal lands. It is undertaken only after written requests for assistance are received from the land-managing Federal agency. This season work was done for the Forest Service, Bureau of Indian Affairs, and the Bureau of Land Management.

Grasshopper infestations were very severe in several states, and the control work that we participated in was but a small part of the acreage that should have been done. Both in Idaho and Montana there were considerable reinfestations of treated range by 'hoppers moving from nearby untreated areas.

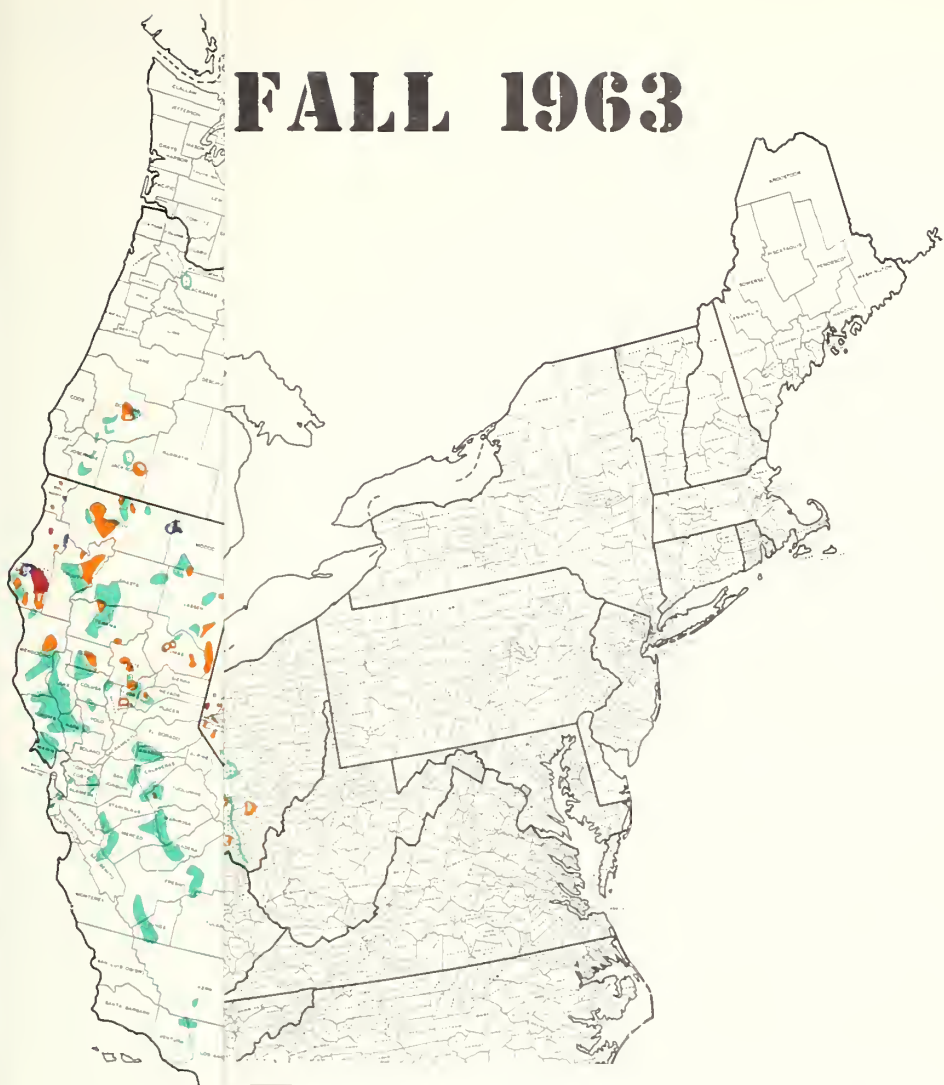
Early in the season it was believed that a serious situation was imminent in two areas in Nevada. Weather conditions there did not favor the grasshoppers during the late spring, the infestations did not develop, and it was not necessary to effect control. Elsewhere in Nevada, range fires destroyed many grasshoppers, together with the range grasses, during the fore part of August.





Utah infestations were normally heavy in those areas where large acreages of Conservation Reserve lands are located. No work was requested by the owners of these private lands. The dry conditions which existed during 1963 in eastern Colorado and New Mexico persisted in 1964, and grasshoppers did not develop as a widespread problem in either state.

During the summer a disturbing number of flights of Melanoplus sanguinipes was noted in several states. Some of these movements may have resulted in extensions of infestations or possibly could infest new areas. Fall surveys, as well as nymphal surveys in the spring, should give us a better estimate of what will be problem areas in 1965.

Near the end of the fiscal year, a contract was negotiated with the University of Wyoming to monitor the impact of technical Malathion as applied on grasshoppers, upon terrestrial and aquatic Arthropods. The field work was done on this program in July, August, and September, and a final report will be submitted to PPC by the University in April 1965.

FALL 1963



-  **VERY ABUNDANT** 28 OR MORE GRASSHOPPERS PER SQUARE YARD
-  **ABUNDANT** 15 - 27 GRASSHOPPERS PER SQUARE YARD
-  **MODERATE** 8 - 14 GRASSHOPPERS PER SQUARE YARD
-  **LIGHT** 3 - 7 GRASSHOPPERS PER SQUARE YARD

SOLID COLORS - RANGELAND INFESTATIONS
 STIPPLED COLORS - CROPLAND INFESTATIONS

NECESSITY FOR CONTROL ON CROP OR RANGELAND NEXT SEASON WILL DEPEND UPON TYPE OF HABITAT, SPECIES PRESENT, WEATHER, AND CONDITION OF VEGETATION.

DETAILED INFORMATION CONCERNING THE GRASSHOPPER PROBLEM IN SPECIFIC AREAS CAN BE OBTAINED FROM STATE PEST CONTROL OFFICIALS, COUNTY AGENTS, AND PLANT PEST CONTROL DIVISION PERSONNEL.

PREPARED IN PPC, ARS, USDA
 DECEMBER 1, 1963

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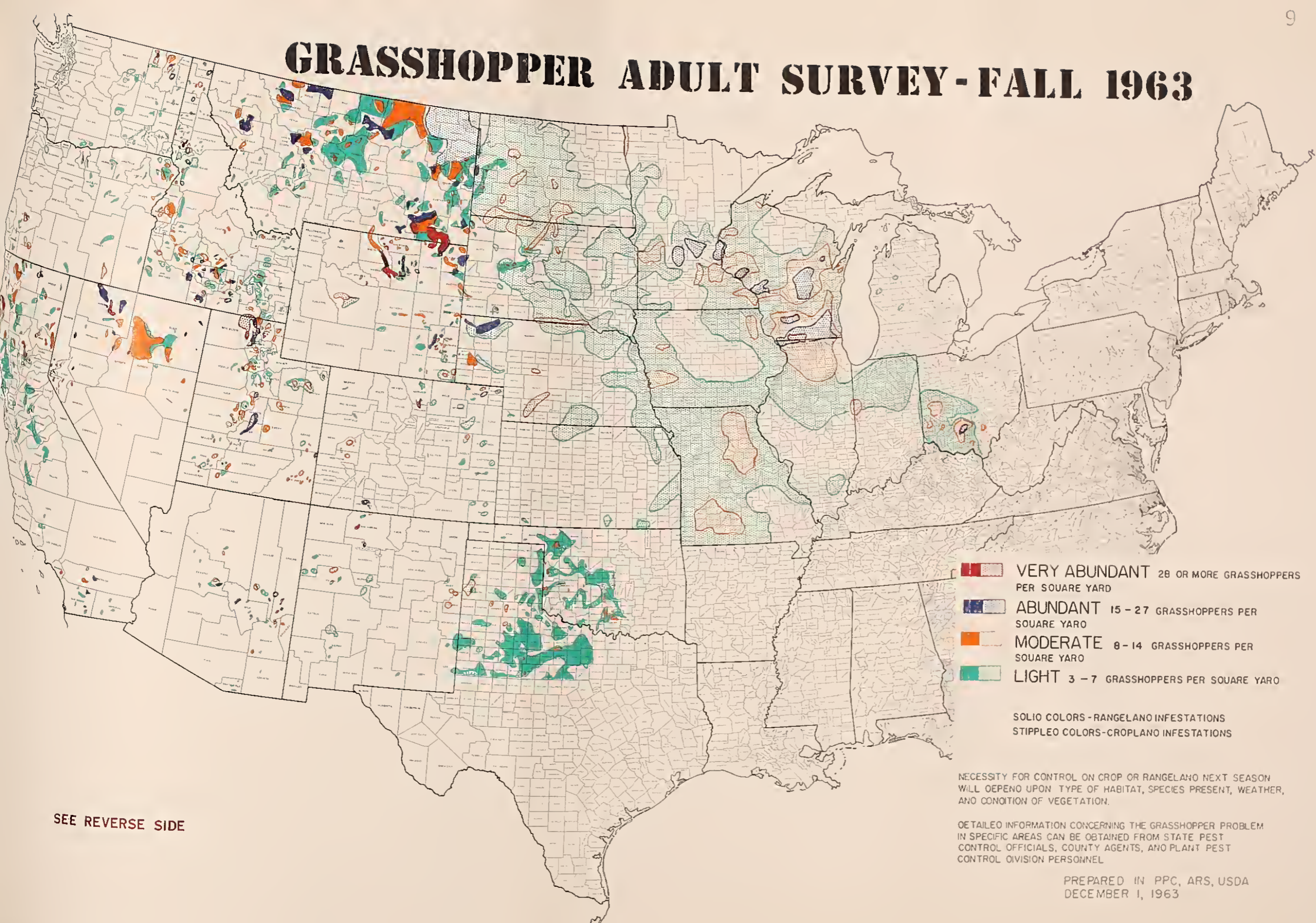
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GRASSHOPPER ADULT SURVEY - FALL 1963



SEE REVERSE SIDE

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

TO COOPERATORS

This map is based upon the results of cooperative grasshopper adult surveys made during the late summer and fall of 1963. The survey reveals where and how many grasshoppers infest an area, and indicates the potential severity of infestations for 1964. Nymphal surveys, made in the spring, determine population densities, and indicate those areas where control may be necessary in 1964.

The infestations in croplands, shown on the map in stippling, appear to be about the same as those which were indicated in the 1962 fall survey. Control on those lands will be handled by the farmers with technical assistance from Division and State personnel. The infested range areas, shown on the map in solid colors (orange, blue and red only), total 10,014,010 acres in 16 Western and Midwestern States. Shaded areas on the map are diagrammatic. Within these areas, infestations may be solid or spotted.

RANGELAND GRASSHOPPER INFESTATIONS – ACREAGE BY REGIONS, FALL 1963

(Moderate Populations or Above – Orange, Blue and Red)

REGION AND STATE	LANDOWNERSHIP – ACRES		TOTAL ACRES	REGION AND STATE	LANDOWNERSHIP – ACRES		TOTAL ACRES
	PRIVATE AND STATE	PUBLIC DOMAIN			PRIVATE AND STATE	PUBLIC DOMAIN	
CENTRAL							
Nebraska	465,000	65,000	530,000	Nevada	31,600	302,640	334,240
No. Dakota	3,480	47,280	50,760	New Mexico	3,600	900	4,500
So. Dakota	118,060	43,760	161,820	Oregon	36,050	7,250	43,300
				Utah	130,680	407,620	538,300
WESTERN				Washington	22,000	—	22,000
Arizona	32,500	49,300	81,800	Wyoming	817,000	160,500	977,500
California	296,750	14,100	310,850				
Colorado	34,100	5,760	39,860	SOUTHERN			
Idaho	190,000	755,000	945,000	Oklahoma	123,280	—	123,280
Montana	4,060,000	1,727,000	5,787,000	Texas	63,800	—	63,800

The survey was planned and performed by the Plant Pest Control Division, Agricultural Research Service, in cooperation with various State agencies concerned.

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GE BY REGIONS, FALL 1963

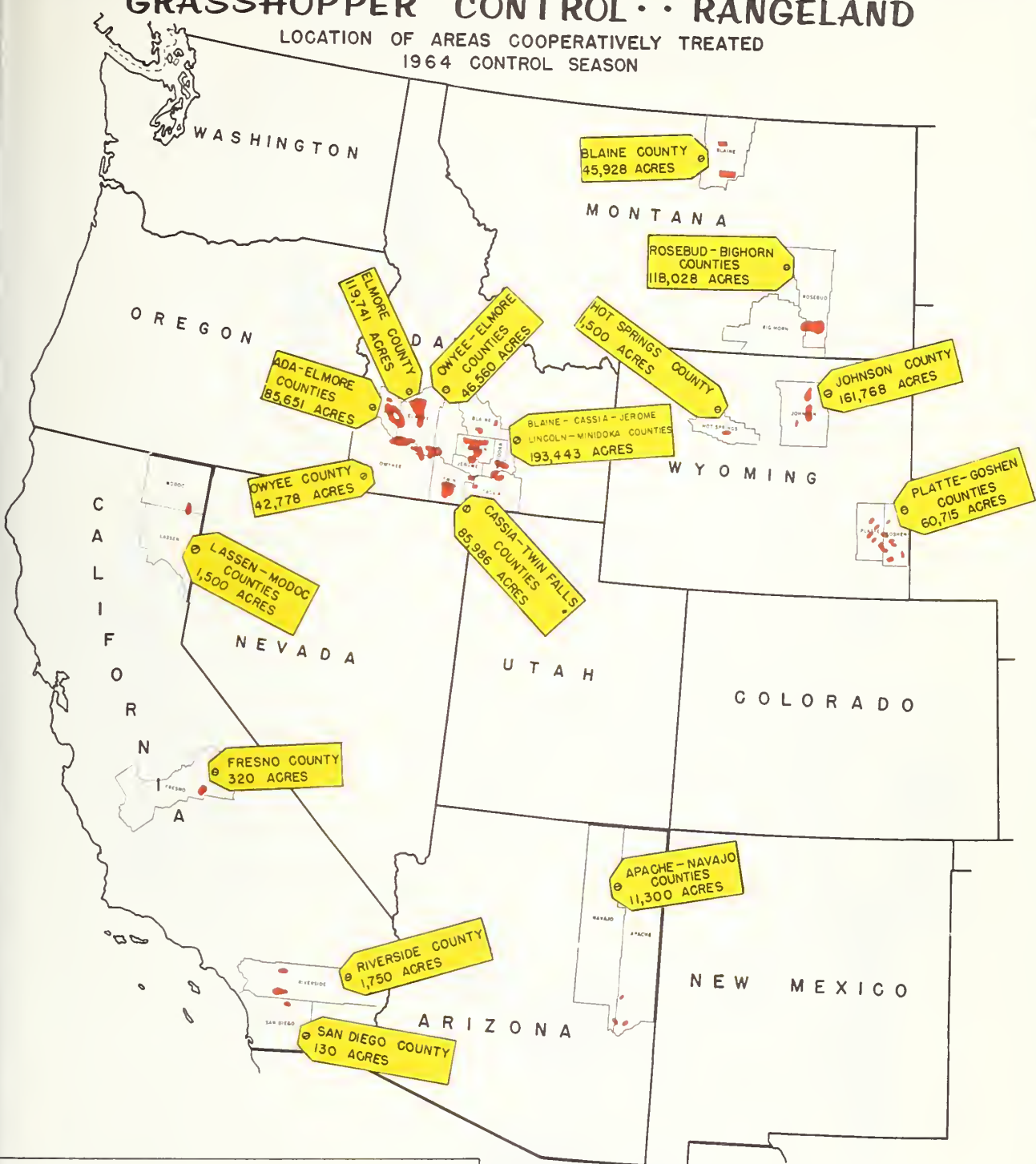
Blue and Red)

↓	LANDOWNERSHIP - ACRES		TOTAL ACRES
	PRIVATE AND STATE	PUBLIC DOMAIN	
	31,600	302,640	334,240
o	3,600	900	4,500
	36,050	7,250	43,300
	130,680	407,620	538,300
1	22,000	— —	22,000
	817,000	160,500	977,500
	123,280	— —	123,280
	63,800	— —	63,800

ice, in cooperation with various State agencies concerned.

GRASSHOPPER CONTROL •• RANGELAND

LOCATION OF AREAS COOPERATIVELY TREATED
1964 CONTROL SEASON



Treated areas are shown diagrammatically and not to scale because of small number of acres involved in some counties. Actual acres are shown on legends.

TOTAL ACRES TREATED 977,098

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION
AUGUST 24, '64

GRASSHOPPERS

AREAS WITH HISTORY OF GRASSHOPPER INFESTATIONS



WESTERN REGION



PLANT PEST CONTROL DIVISION
ARS, USDA

WORK REPORT
1963 ADULT GRASSHOPPER SURVEY

Program Grasshopper

Fiscal Year 1964

State	No. of Counties Surveyed	Total No. of Stops	Miles Traveled		No. of Men		Man Days		Time Period		Cost	
			PPC	State & Co.	PPC	State & Co.	PPC	State & Co.	Start	Stop	PPC	State & Co.
Arizona	17	300	10,289	0	13	0	102	0	6/18/63	10/4/63	\$ 1,235	\$ 0
California	57	604	15,061	2,127	14	22	93	35	5/20/63	8/23/63	655	196
Colorado	46	431	7,549	7,490	7	6	51	24	7/22/63	8/7/63	736	814
Idaho	44	545	26,557	0	8	0	145	0	8/5/63	8/30/63	1,533	0
Montana	56	706	21,579	0	7	0	94	0	7/11/63	8/23/63	1,074	0
Nevada	16	170	5,820	2,500	3	1	38	15	8/6/63	8/23/63	257	330
New Mexico	30	238	9,925	3,995	4	1	47½	36	7/16/63	8/26/63	537	145
Oregon	32	169	7,727	965	3	2	42½	7	7/15/63	8/27/63	463	16
Utah	29	269	15,303	--	6	0	65	0	8/6/63	9/6/63	970	0
Washington	20	126	4,072	--	1	0	20	0	7/16/63	8/19/63	204	0
Wyoming	23	172	12,462	4,139	3	2	23	24	7/29/63	8/31/63	393	187
Totals	370	3,730	136,344	21,216	69	34	721	141			\$8,057	\$1,688

SURVEY AND DETECTION REPORT

Program Grasshopper

Fiscal Year 1964

STATE	NUMBER OF ACRES INFESTED	
	Adult Survey	Nymphal Survey
Arizona	81,800	58,000
California	310,850	404,670
Colorado	39,860	4,500
Idaho	945,000	1,730,800
Montana	5,787,000	718,360
Nevada	334,240	0
New Mexico	4,500	0
Oregon	43,300	1,500
Utah	538,300	333,000
Washington	22,000	5,000
Wyoming	977,500	212,000
Total	9,084,350	3,467,830

ASSOCIATED ACTIVITY REPORT

WESTERN REGION

PROGRAM Grasshopper

FISCAL YEAR 1964

STATE	PUBLIC MEETINGS ATTENDED	PRESENTATIONS					FEATURE & NEWS STORIES	EXTENT THESE AIDS WERE USED				SPECIAL REPORTS	MAN-HOURS OF TECHNICAL ASSISTANCE
		TALKS	SLIDES	FILMS	RADIO	TV		EXHIBITS	BUL.	CIR.	INFEST. MAPS & POSTERS		
Arizona	1	1			1	1	5	3	25	320	38	1	135
California										19			
Colorado	4	1								310	117		4
Idaho	11									149	86		4
Montana	9	9								164			
New Mexico									169		70		
Oregon										300	43	12	
Utah	4	4	22	1	3		9	1		3,450	50	4	
Washington										203	28	21	
Wyoming	9	9		1	1				100	276	706		8
TOTAL	38	24	22	2	5	1	14	4	294	5,191	1,138	38	151

GRASSHOPPERS

THE PICTURE CHANGES— low volume insecticide, no residue.



TBM spray plane equipped with flat spray nozzle tips for low volume application. Note the 1/8 inch bleed line leading from the tip of the boom back to the insecticide tank. This plane is able to apply volume rates as low as 2 liquid ounces of technical malathion per acre.



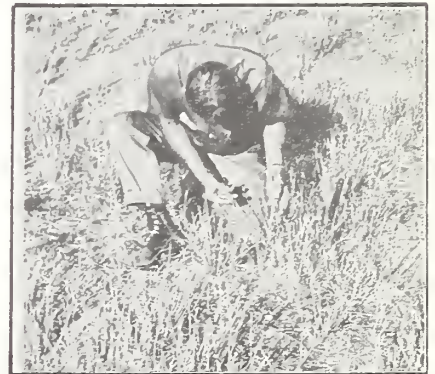
DC-3 spraying grasshoppers near Hollister, Idaho, July 1964.



Sequoia National Forest, California -- 6 year old plantation of ponderosa pine treated May 26, 1964. Note almost complete defoliation of tree on left. Tree on right not attacked.



Grasshopper damage to beans, July 1964, near Twin Falls, Idaho.

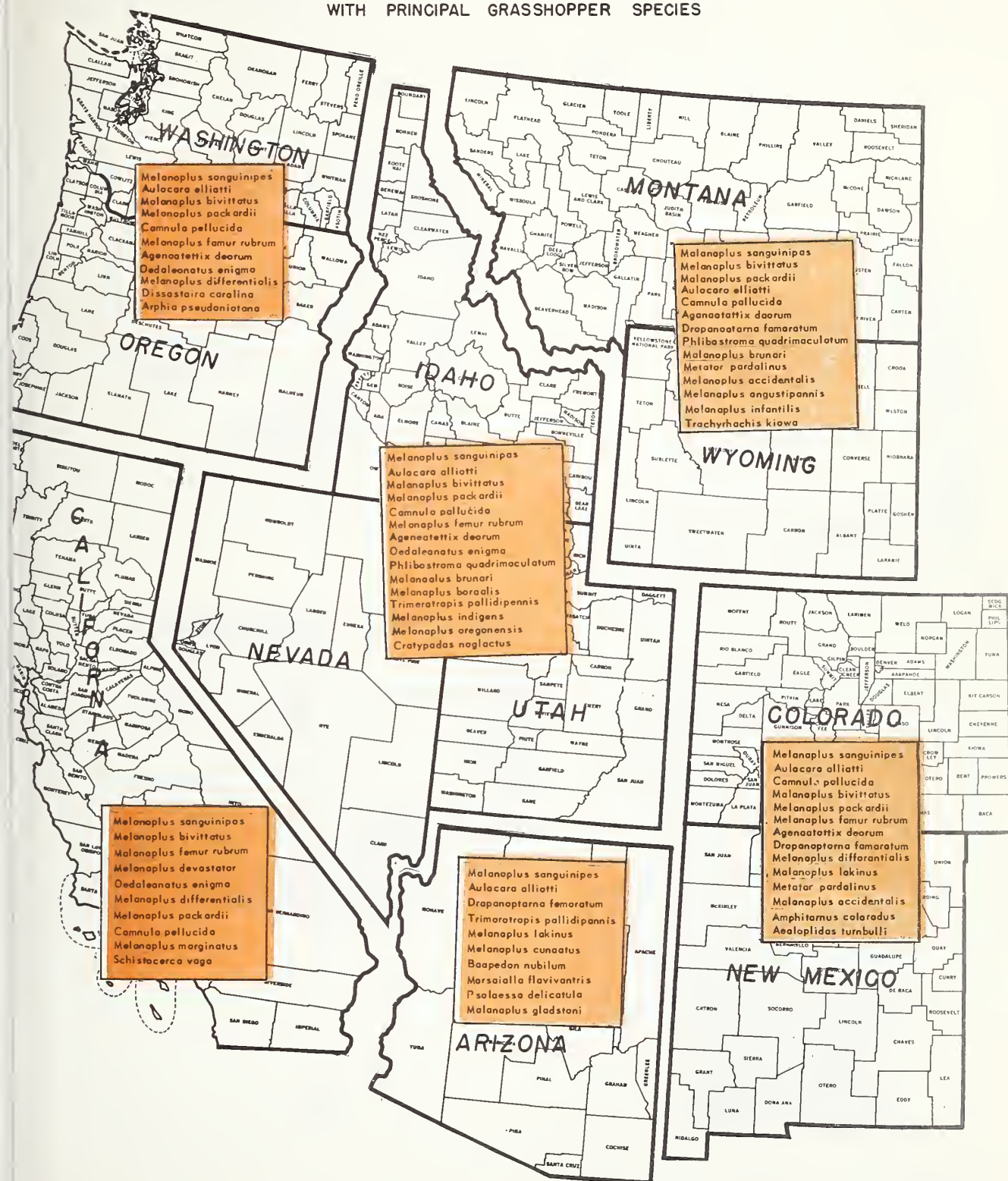


Grasshopper damage to alfalfa near Arrow Rock Dam -- Boise, Idaho, July 1964.

GRASSHOPPER ADULT SURVEY

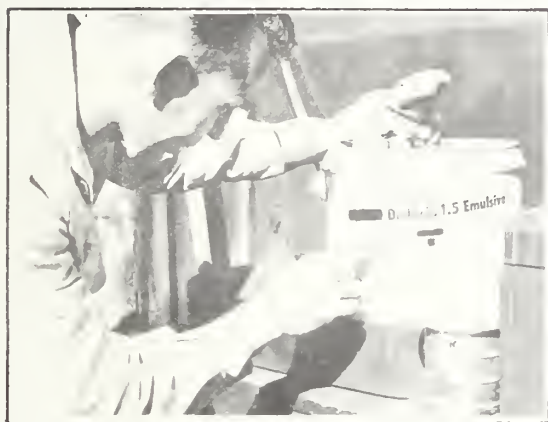
WORKSHOP AREAS

WITH PRINCIPAL GRASSHOPPER SPECIES



SAFETY

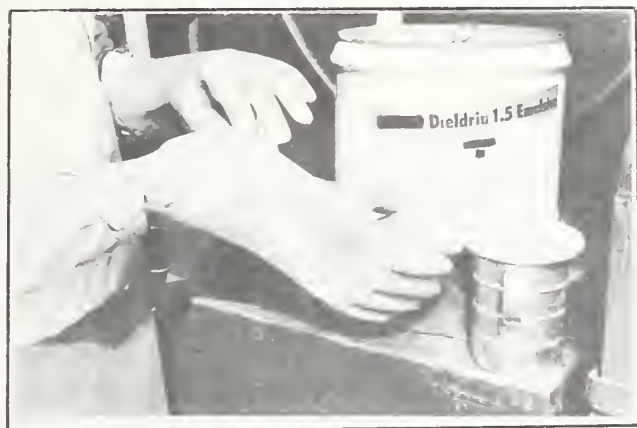
IT PAYS! MAYBE NOT IN CASH, BUT IN EYES, GOOD HEALTH and LIVES.



READ THE LABEL ---



KNOW WHAT IT MEANS
(REFER TO THE MANUAL)



WEAR PROTECTIVE CLOTHING



WASH WITH SOAP and WATER

Japanese Beetle



Japanese Beetle

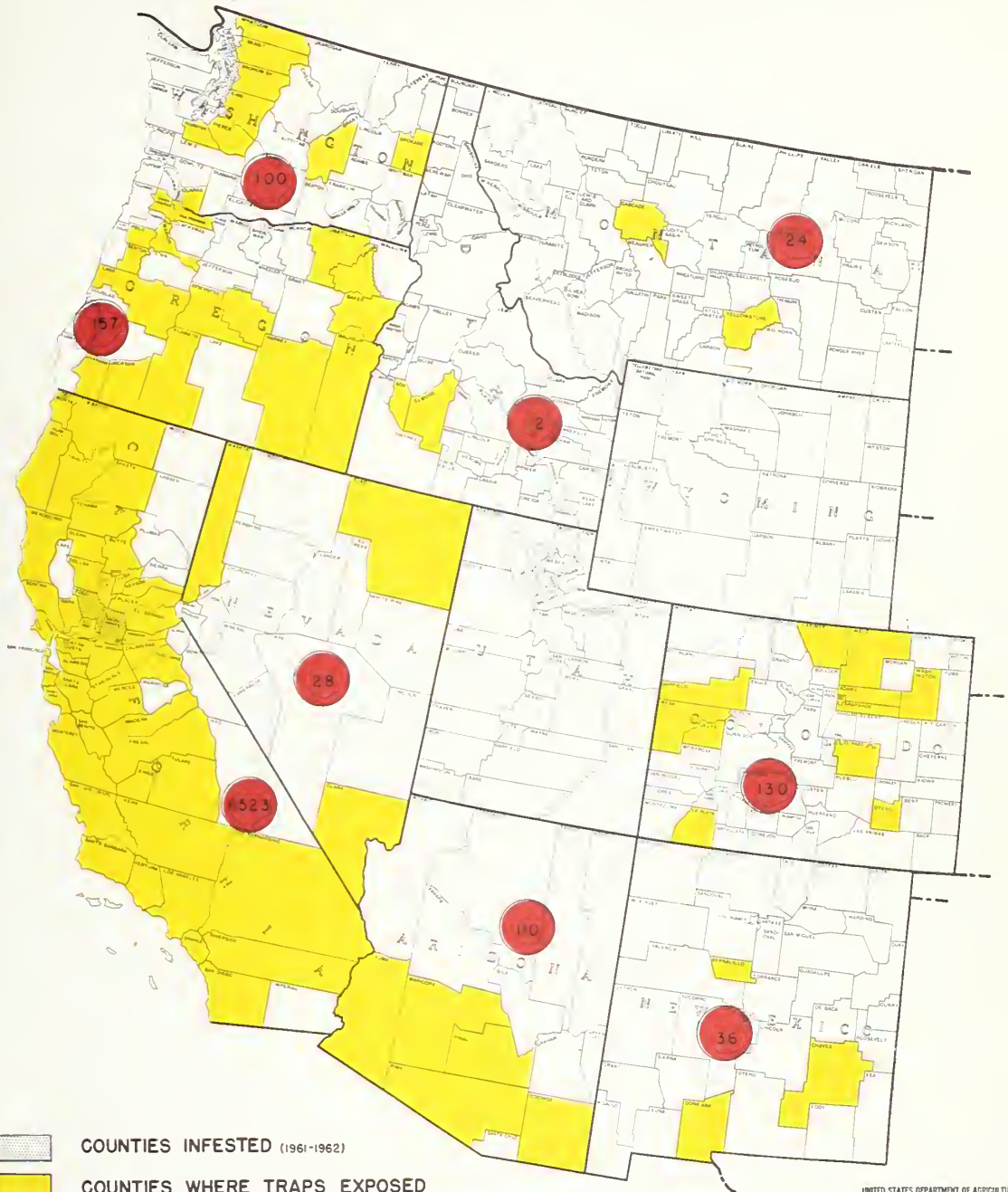
The first sentence of last year's report is still appropriate: "No live Japanese beetles have been found in the California infested area since June 18, 1962, although the detection program has been vigorously pursued." There have been reported collections of beetles both inside and outside of the regulated area, but intensive investigation of these reports has revealed each to be either some other insect or a case of a prankster "salting" a trap.

Both trapping activities and visual inspections have been increased as we approach eradication in the Sacramento area. More than 11,000 traps were placed and regularly checked in the State, and visual inspections were made on more than 60,000 accumulated acres on over 15,000 properties.

Soil samples from the eradication area have been analyzed periodically to assure that the concentration of insecticide therein does not fall below a level that would kill early instar grubs. Eradication procedures will be continued until there is reasonable assurance that the objective--eradication--has been obtained. Appropriate regulatory vigilance is being maintained.

Elsewhere in the Region traps were exposed during the season at most important rail, air, and bus terminals. No Japanese beetles were trapped. At west coast air terminals most airplanes were checked which had originated from or stopped at cities declared hazardous on account of these beetles. Very few beetles were found, although inspectors, flight and baggage crews, and cleanup personnel had been alerted to look for the pest. When measured by the number of live specimens reaching the west coast, the procedures being used to prevent cross-country movement of Japanese beetles by aircraft appear to be very effective.

JAPANESE BEETLE



UNITED STATES DEPARTMENT OF AGRICULTURE
 AGRICULTURAL RESEARCH SERVICE
 PLANT PEST CONTROL DIVISION
 WESTERN REGION
 OAKLAND, CALIF.
 JULY 1964

SURVEY AND DETECTION REPORT

Program Japanese Beetle

Fiscal Year 1964

State	No. Properties Surveyed	No. Acres Surveyed	No. Traps Installed
Arizona	1		110
California	15,213	60,371	11,523
Colorado			130
Idaho			12
Montana			24
Nevada			28
New Mexico			36
Oregon			157
Washington			100
Totals	15,214	60,371	12,120



ASSOCIATED ACTIVITY REPORT

WESTERN REGION

PROGRAM Japanese Beetle

FISCAL YEAR 1964

STATE	PUBLIC MEETINGS ATTENDED	PRESENTATIONS					FEATURE & NEWS STORIES	EXTENT THESE AIDS WERE USED				SPECIAL REPORTS	MAN-HOURS OF TECHNICAL ASSISTANCE
		TALKS	SLIDES	FILMS	RADIO	TV		EXHIBITS	BUL.	CIR.	INSECT. MAPS & POSTERS		
Arizona								1		1,564			10
California		5	2	2						11,519	91		
Colorado			25		1	1			32	192		2	14
New Mexico									74			12	
Oregon													
Utah										3,965		21	
Washington													
TOTAL		5	27	2	1	1		1	106	17,240	91	35	24

Khapra

Beetle



Khapra Beetle

For a period of almost 20 months from July 11, 1962, through March 5, 1964, the Western Region had no known khapra beetle infestations. This was the longest period of apparent freedom from the pest since cooperative suppressive measures were undertaken in February 1955. New Mexico has not had a khapra beetle infestation since the summer of 1959, and California's last infestation was reported January 2, 1962. This khapra beetle-free period came to an end March 5, 1964, when the first of four properties in Yuma County, Arizona, was found to be infested. This property had been previously treated and was found heavily reinfested March 5. This property was the probable source of spread by the pest to three associated premises. Fumigation of the four properties with methyl bromide was accomplished between April 22 and May 30, 1964, and the Western Region was again free of the khapra beetle. Total volume treated was 1,281,276 cubic feet.

In the past, sacks or white cloth placed in storage areas have been used as traps to supplement visual inspection. During this fiscal year, a Trogo-board trap has been used quite extensively in the Region. This trap was developed by personnel of the Bureau of Entomology, California Department of Agriculture. The traps are made of open-faced, corrugated cardboard, coated with a lure material prepared by mixing equal parts of wheat germ and powdered milk.

Cooperative inspections for khapra beetle have been reduced in line with the absence of infestations. For the fiscal year 1964 this reduction is more than 50 percent, compared to fiscal year 1963. Suspect properties will continue to receive adequate attention.

Cargo which had left ports before ships were found to be infested with khapra beetles was located and fumigated. Reintroduction of the pest from abroad continues to be a threat. Plant Quarantine Division is doing an outstanding job in finding infestations of khapra beetle in ships and on cargo. Coir yarn imported from India and used in the growing of hops has been a consistently infested commodity arriving at west coast ports.

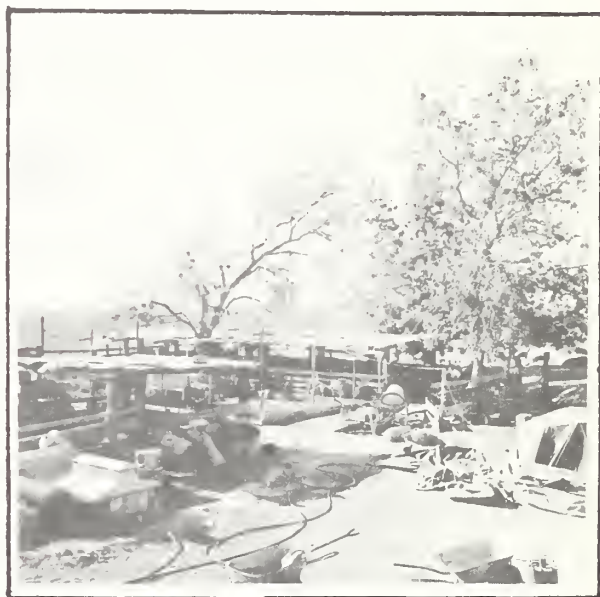
KHAPRA BEETLE

THE LAST PROPERTY FUMIGATION ?

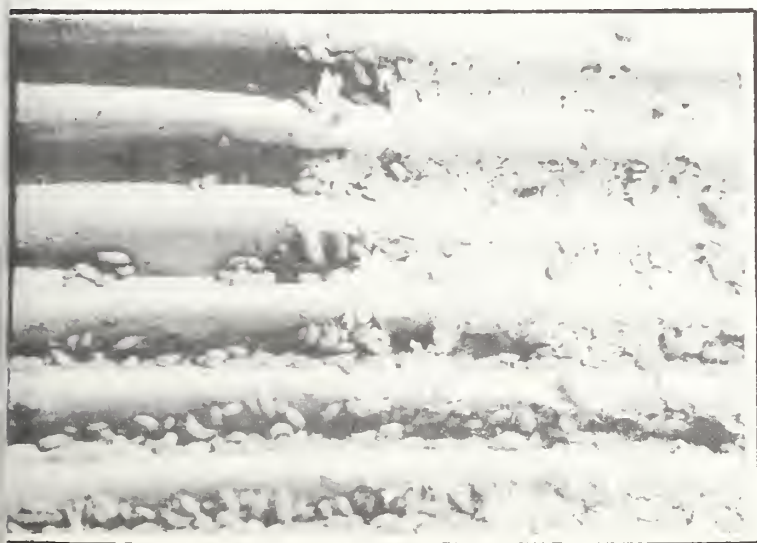
18



Arthur Smart Hog Farm, Yuma, Arizona, May 30, 1964. Removing approximately 12,000 lbs. of meat from the slaughter house storage area to a leased refrigerated truck for temporary storage during period of fumigation.



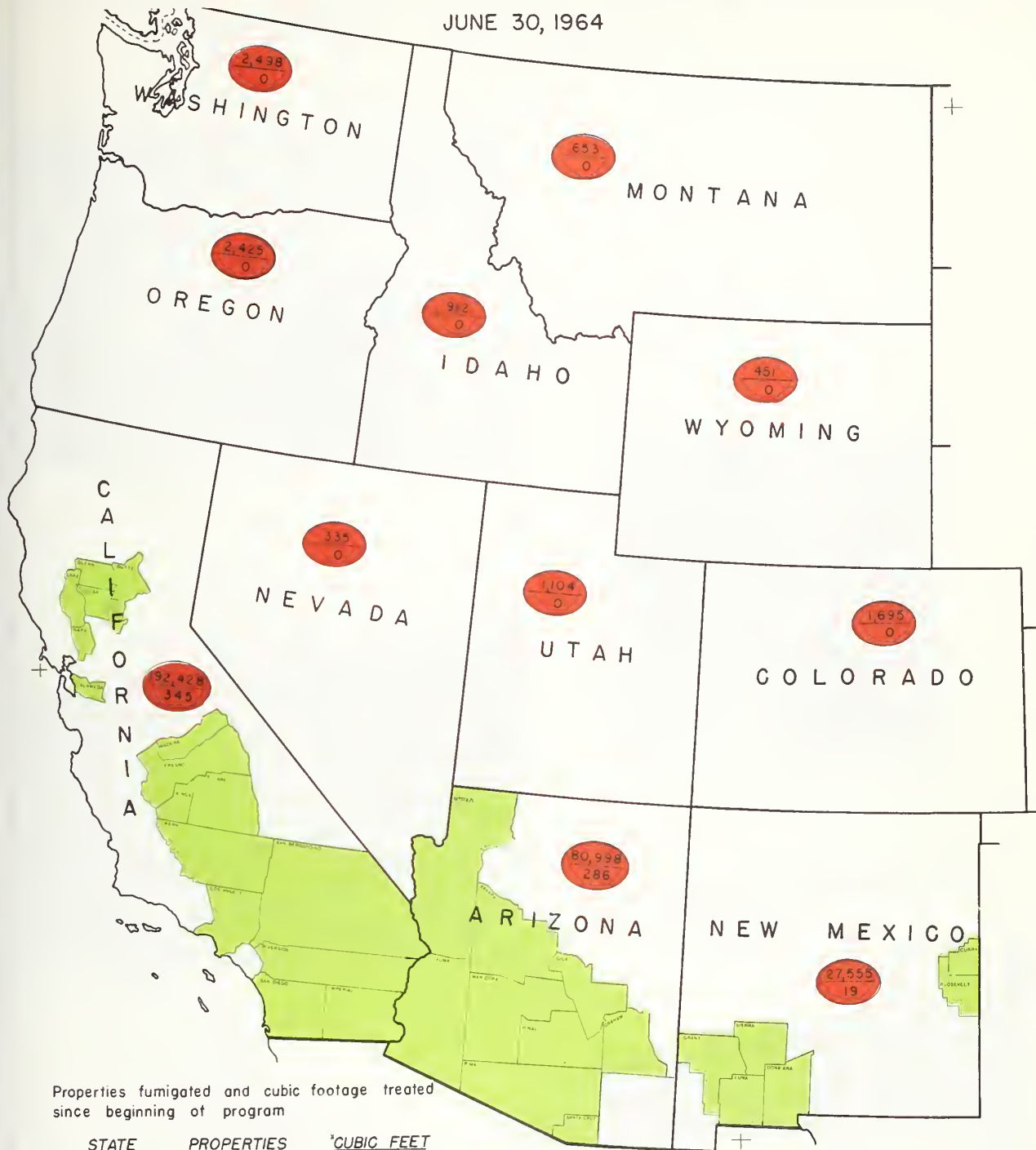
Arthur Smart Hog Farm.
Part of hog pen area fumigated.



Khapra beetle larvae recovered in Trogotrap placed in the S & W Feed Lot warehouse, Yuma, Arizona. Exposed 2 days.

KHAPRA BEETLE ERADICATION

JUNE 30, 1964




Properties fumigated and cubic footage treated since beginning of program

STATE	PROPERTIES	³ CUBIC FEET
ARIZONA	286	75,220,487
CALIFORNIA	345	97,735,534
NEW MEXICO	19	1,779,808
TOTAL	650	174,735,829

* (Includes initial and repeat fumigations)

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION
AUGUST 20 '64

 COUNTIES WHERE KHAPRA BEETLES HAVE OCCURRED, WERE ERADICATED, AND NOT NOW KNOWN TO BE PRESENT

 UPPER FIGURE — TOTAL INITIAL and REPEAT INSPECTIONS
LOWER FIGURE — TOTAL PROPERTIES FOUND INFESTED

KHAPRA BEETLE

S and W Feed Lot Yuma, Arizona fumigated May 23, 1964



Hole cut in grain storage warehouse floor and portion of wall removed by property owner to facilitate inspections made to locate any possible condition that might require special handling to assure a satisfactory fumigation.

Aerial view -- S & W Feed Lot



Baled straw used to provide headspace for the fumigation of blacktop surface areas adjoining warehouse and tanks, etc.



SURVEY AND CONTROL ACCOMPLISHMENT

Fiscal Year 1964

Program Khapra Beetle

State	Properties		Properties Fumigated	Volume Fumigated (cu. ft.)
	Inspected	Infested		
Arizona	4,878	1	1	12,959
California	4,308			
Colorado	1			
Idaho	51			
Montana	0			
Nevada	0			
New Mexico	2,321			
Oregon	88			
Utah	0			
Washington	185			
Wyoming	0			
Totals	11,832	1	1	12,959

Since beginning of program:

Initial and repeat inspections, 311,054
 Properties infested: Arizona, 286; California, 345; New Mexico, 19
 Cubic feet treated: Arizona, 75,220,487*; California, 97,735,534**; New Mexico, 1,779,808
 *Cubic footage includes 12 reinfestations in Arizona with a total of 9,001,445 cubic feet.
 **Cubic footage includes 27 reinfestations in California with a total of 14,081,683 cubic feet.

KHAPRA BEETLE

New introductions at Ports-of-Entry may temporarily escape detection but are soon found and promptly treated.



Coir yarn arriving Portland, Oregon, on S/S BENGALAN from the Middle East was delivered to Hermiston, Oregon, before discovery of khapra beetle in the hold of the ship and on cargo.

Close up of bale showing burlap on the exterior, a rush-like layer of matting next, and finally the tightly compressed coir yarn.



"Frankenstein successfully develops a potent brew."

Air temperatures varied between 20 and 40 degrees during fumigation, making it necessary to volatilize the gas during introduction. To achieve this methyl bromide from 1-pound cans was taken via tube through a coil suspended in a bucket of hot water. A butane 2-burner stove was used to heat the water.



A hop vineyard near Hermiston. Coir yarn is used to string from the overhead wires to the ground. The hop vines using the coir yarn for support grow up to the top wires and form a canopy over the field.



Testing for methyl bromide residue, after tarp has been removed from stack of coir yarn.

ASSOCIATED ACTIVITY REPORT

WESTERN REGION

PROGRAM Khapra Beetle

FISCAL YEAR _____

STATE	PUBLIC MEETINGS ATTENDED	PRESENTATIONS					FEATURE & NEWS STORIES	EXTENT THESE AIDS WERE USED				SPECIAL REPORTS	MAN-HOURS OF TECHNICAL ASSISTANCE
		TALKS	SLIDES	FILMS	RADIO	TV		EXHIBITS	BUL	CIR.	INFEST. MAPS & POSTERS		
Arizona	2	2					7		32	2,611		977	45
California		1	1							16			
Colorado									9				
New Mexico									383				
Oregon												12	
Utah										3,450			
Washington		1								310		21	6
TOTAL	2	4	1				7		424	6,387		1,010	51



Mexican Fruit Fly



Mexican Fruit Fly

Detection trapping and insecticide spray control measures were carried on along the Mexican Border in San Diego County from the Pacific Ocean eastward into the mountains during the first 9 months of the fiscal year. No sprays were applied during the last quarter. Particular attention was given to the area from the Pacific Coast to the base of the mountains, due to the extensive occurrence of host plants and the favorable coastal climate. In the desert area of Imperial County, high summer temperatures prevent the establishment of fruit fly infestations.

McPhail traps are operated year-round, with once-a-week servicing. From 2,500 to 3,000 traps were in use from July to March, and 3,500 from April to June 30. Five hundred were in the mountain area north of the International Border. The other traps are in the more favorable and vulnerable sector near the coast. Additional traps are operated by State and county personnel in other citrus-growing counties and localities with a climate favorable to fruit fly infestations. Visual inspection of fallen or suspected fruits of several kinds is made throughout the year. No Mexican fruit flies were trapped, nor were larvae observed.

The Mexico Region inaugurated a sterile male fly release program on April 23. At that time, 45,000 chemo-sterilized male flies were liberated in Tijuana. Throughout the remainder of the fiscal year, increasingly large numbers of flies were released at 2-week intervals. Approximately 750,000 male flies were released in Mexico during the period April 23 to June 30. Each "batch" of flies was chemically dyed so as to be readily distinguishable from wild flies and to facilitate identification of individual flies, if later trapped.

It had been expected that these flies would move over a relatively large area in southern California and that they would be trapped somewhat frequently.

As of June 30, however, only 14 of the flies had been trapped on the California side. None of the flies had been trapped across the Border in areas lying more than one mile from the point of release.

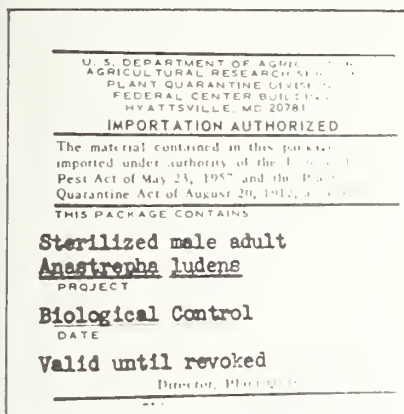
No native or "wild" Mexican fruit flies were trapped in California during fiscal year 1964, nor were any larval infestations found.

Because Mexican fruit fly work done in Arizona is in connection with the overall fruit fly detection program, that work is discussed under the Plant Pest Survey section.

MEXICAN FRUIT FLY

WHAT WILD FEMALES DON'T KNOW, CAN HURT THEM

Overflooding native Mexican Fruit Fly populations with chemo-sterilized male flies
Tijuana, Baja California, Mexico, June 1964



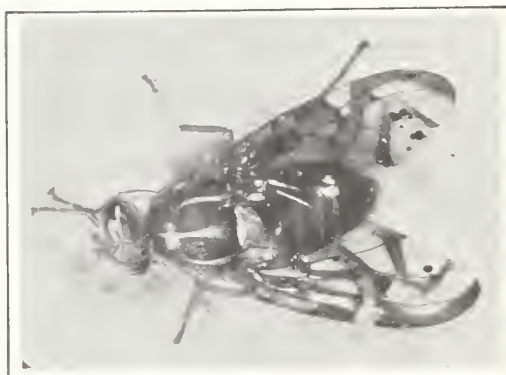
Sterilized male adult *Anastrepha ludens* were shipped via Air Express from Mexico City under Importation Permit.



Shipping box of quart containers with approximately 300 "marked" sterilized male flies in each container.



Quart container showing "marked" sterilized male flies. Note sponge saturated with water to provide needed moisture.



Close-up of "marked" sterilized male fly. Note spots on wing which are flecks of brilliantly colored dye used in marking.



Sterilized flies being released in back yard planted fruit tree.



Released sterilized flies on fig leaf.

SURVEY AND DETECTION REPORT

Program Mexican Fruit Fly Fiscal Year 1964

State	No. Properties Surveyed	No. Traps Installed	No. Positive Specimens	No. Properties Infested
Arizona	260	79	46	14
California	49,533	3,755	1	1
Totals	49,793	3,834	47	15

ASSOCIATED ACTIVITY REPORT

WESTERN REGION

PROGRAM Mexican Fruit Fly

FISCAL YEAR 1964

STATE	PUBLIC MEETINGS ATTENDED	PRESENTATIONS					FEATURE & NEWS STORIES	EXTENT THESE AIDS WERE USED				SPECIAL REPORTS
		TALKS	SLIDES	FILMS	RADIO	TV		EXHIBITS	BUL.	CIR.	INFEST. MAPS & POSTERS	
Arizona	1	1				1	13			35		
California	1	2	1							100		
Utah												
TOTAL	2	3	1			1	13			135		

Mormon

Cricket



Mormon Cricket

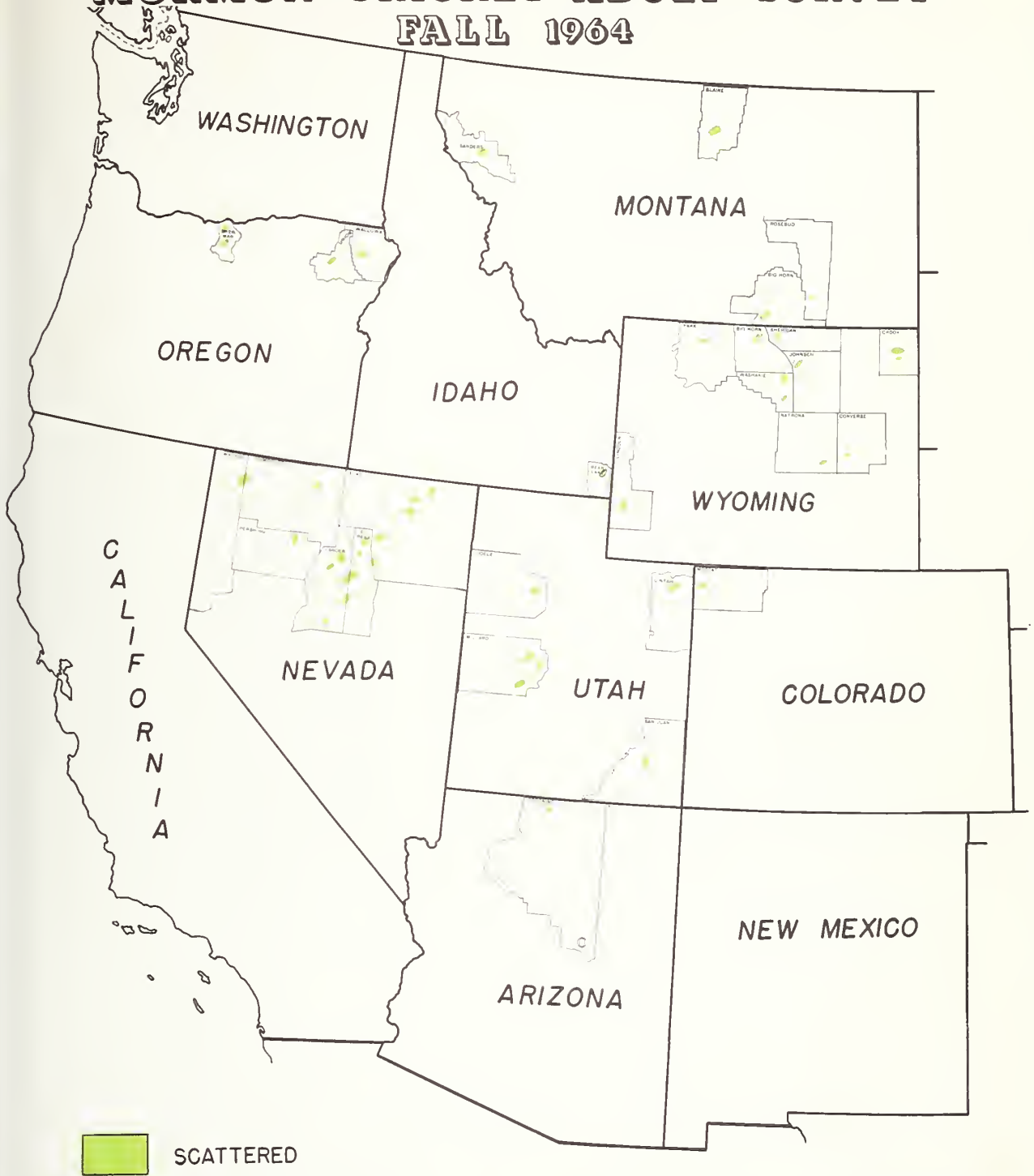
No specific Mormon cricket suppression work was required in fiscal year 1964. Except for those few instances where Mormon crickets occurred in areas sprayed for grasshopper control, none were treated. Very light to light infestations of these insects were found in Arizona, Colorado, Idaho, Nevada, Montana, Oregon, Utah, Washington, and Wyoming.

The infestation on Bear Mountain in Daggett County, Utah, which was controlled by the small wasp, Tachysphex sp., last season did not persist this year. Surveys of the area showed that neither Mormon crickets nor wasps occur there now.

All known infested areas will be checked in the spring to assure that any threatening buildups will be detected in time to prevent development of infestations covering large areas.



MORMON CRICKET ADULT SURVEY FALL 1964



SURVEY AND DETECTION REPORT

Program Mormon Cricket

Fiscal Year 1964

State	NUMBER OF ACRES INFESTED	
	Adult Survey	Nymphal Survey
Idaho	--	600
Nevada	33,000	--
Wyoming	5,900	500
Totals	38,900	1,100

ASSOCIATED ACTIVITY REPORT

WESTERN REGION

PROGRAM Mormon Cricket

FISCAL YEAR 1964

STATE	PUBLIC MEETINGS ATTENDED	PRESENTATIONS					FEATURE & NEWS STORIES	EXTENT THESE AIDS WERE USED				SPECIAL REPORTS	MAN-HOURS OF TECHNICAL ASSISTANCE
		TALKS	SLIDES	FILMS	RADIO	TV		EXHIBITS	BUL.	CIR.	INFEST. MAPS & POSTERS		
California				1									
Colorado											13		
Idaho											12		
Oregon												12	
Utah	1	1	4		1		1	1	1,380			2	75
Washington											12	21	
Wyoming	1	1									9		
TOTAL	2	2	4	1	1		1	1	1,380		46	35	75

Peach

Mosaic



Peach Mosaic

Peach mosaic, a virus disease, is spread in nature by Eriophyes insidiosus, a microscopic mite; the disease can be spread by man through infected budwood and infected nursery stock. This disease was first reported from Texas and Colorado in 1931, and from southern California in 1933. In the Western Region it occurs in New Mexico, Colorado, Utah, Arizona, and California. The disease is systemic, and once a tree becomes infected it remains so. Peach mosaic does not kill its hosts; however, they become weak and are more susceptible to winter kill and other debilitating influences. Fruit production is reduced in quality and quantity.

Cooperative control of the disease began in 1935, and since that time 350,000 peach trees have been removed and destroyed in the Western Region because of peach mosaic, representing a loss of \$17.5 million.

In California, Colorado, and Utah, annual inspections and roguing of infected trees have resulted in very good control of the disease. For the fiscal year 1964 in the peach mosaic regulated area of California, 128,307 trees were inspected and 85 infected trees were found on 40 properties. In the nonregulated areas of California, 180,416 trees were inspected without finding the disease. In Delta, Mesa, and Montrose Counties, Colorado, 774,558 trees were inspected. Only 184 infected trees were found on 77 properties and removed. None of these was in Delta County. Inspections were made in four Utah counties: 24 mosaic trees were found on 18 properties in Grand and Washington Counties; findings were negative in San Juan and Utah Counties. The incidence of the disease is at an all-time low in the control areas.

As a result of the unauthorized movement of budwood from the regulated area, inspections for peach mosaic were made, with negative results, in certain areas of two western states where the disease is not known to occur.

Arizona and New Mexico are not commercial peach-producing states. To some extent, however, peaches are grown in home orchards and as dooryard trees, and in these, peach mosaic occurs quite generally. There is no cooperative, organized control of the disease in these two states.

Funds have been allotted for preliminary work on the proposed irrigation project on the Navajo Indian Reservation in San Juan County, New Mexico. Peaches are one of the agricultural crops best suited to this area. The Bureau of Indian Affairs, through the Navajo Tribal Council, is attempting to interest the Navajos in a program to eradicate peach mosaic from the numerous dooryard and small peach plantings on the Reservation. In

the past the Division conducted a training course on peach mosaic for employees of the Indian Service at Window Rock, Arizona, and at Shiprock, New Mexico.

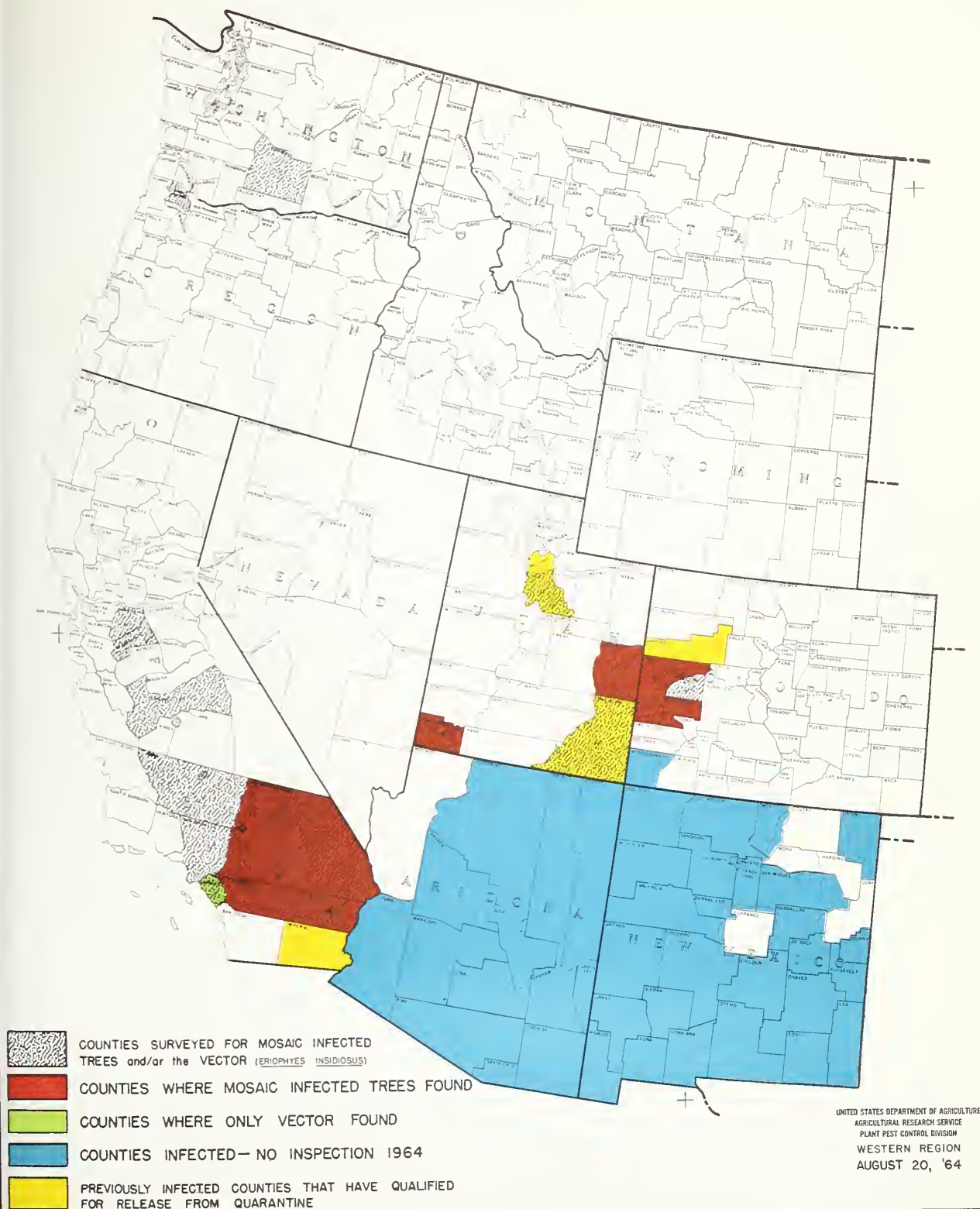
PPC participated with ENT in a survey for the mite vector of peach mosaic in southern California. ENT found the vector, for the first time, at several locations in Orange County. PPC also assists ENT on the vector survey of the Lytle Creek Vector Control Plot in San Bernardino County, California. This plot is isolated from other peach-growing areas. Each spring the host trees in the Lytle Creek Plot are inspected for the vector. At petal fall the trees are sprayed with Diazanone, under the supervision of ENT. Subsequent to the spraying, the plot trees are again inspected. This study has been conducted by ENT since 1961, and only in 1961 and 1964 were live mites found on the postspray inspections. In 1961, 3 live mites were found 38 days after spraying, and in 1964, 150 live mites were found on 3 trees 40 days after spraying. In the Lytle Creek Vector Control Plot the peach mosaic infected trees are not removed. They are left in place as a part of the experiment to determine whether control of disease spread is possible through chemical control of the vector. In 1961 there were 1,342 trees on the several properties in the Lytle Creek Vector Control Plot. Some trees have been removed for various reasons by the property owners, and in 1964 there were 966 trees on these properties. The number of new cases of peach mosaic found by years is: 77 in 1961, 118 in 1962, 46 in 1963, and only 2 in 1964.

During conduct of the peach mosaic survey in the San Joaquin Valley, California, yellow bud mosaic was found in San Joaquin and Stanislaus Counties. Subsequent inspections by state and county inspectors located additional yellow bud infected trees. Yellow bud mosaic is a virus disease transmitted by a nematode. This disease has been present in the Sacramento Valley and in southern California for a number of years and has been the object of eradication efforts by the California Department of Agriculture and the several County Commissions of Agriculture.

There were inspected in the peach mosaic regulated area, 166 nurseries and dealers in 4 California counties, and 2 nurseries in 2 Colorado counties. Two mosaic trees were found and removed from one nursery in San Bernardino County, California. Two budwood sources, one each in Delta and Montrose Counties, Colorado, were inspected and approved. There were no budwood sources in California.

Peach Mosaic Disease Control

1964 CROP SEASON



NURSERY INSPECTION - REGULATED AREAS

Program Peach Mosaic

Fiscal Year 1964

State	No. Counties Inspected With Nurseries	Number Nurseries Inspected	Number Nursery Trees Inspected	Environs Inspected			
				Properties		Trees	
				Inspected	Infected	Inspected	Infected
California	4	166	12,689	1	1	2	2
Colorado	2	2	3,600	3	0	29	0
Totals	6	168	16,289	4	1	31	2

SUMMARY OF INSPECTIONS

Program Peach Mosaic

Fiscal Year 1964

State	Properties		Trees	
	Inspected	Infected	Inspected	Removed
California	3,267	40	308,723	85
Colorado	1,170	77	774,558	184
Oregon	4	0	1,071	-
Utah	1,682	18	83,552	24
Washington	21	0	26,117	-
Totals	6,144	135	1,194,021	293

ASSOCIATED ACTIVITY REPORT

WESTERN REGION

PROGRAM Peach Mosaic

FISCAL YEAR 1964

STATE	PUBLIC MEETINGS ATTENDED	PRESENTATIONS					FEATURE & NEWS STORIES	EXTENT THESE AIDS WERE USED			SPECIAL REPORTS	MAN-HOURS OF TECHNICAL ASSISTANCE
		TALKS	SLIDES	FILMS	RADIO	TV		EXHIBITS	BUL.	CIR.		
California		1	1									
Colorado	3	3		1	3		5		1	300	286	231
New Mexico									84			
Utah	5	4	3				1	1		235	2	
Washington										10		
TOTAL	8	8	4	1	3		6	1	85	545	288	231



Pink

Bollworm



Pink Bollworm

Cotton acreage quotas remained essentially the same as they have been in recent years in our four cotton-producing states--approximately 200,000 acres in New Mexico, 400,000 in Arizona, 900,000 in California, and 3,500 in Nevada.

Nevada and California, and the two westernmost counties of Arizona (Yuma and Mojave), are still not known to be infested with pink bollworms. A population explosion of this pest occurred in eastern and central Arizona in the fall of 1963. Graham County recorded its lowest per acre yield of upland cotton since 1955 and placed the bulk of the blame on pink bollworm and boll rot. Pink bollworms again increased last fall in the Pecos River Valley of New Mexico. Alarming infestations showed up in parts of southern Eddy County. A count of the pink bollworms collected from one 5-bushel gin trash sample showed 7,135 worms. Growers organized meetings and urged farmers to comply with recommended cultural control practices including stalk shredding, deep plowing by February 28, and delayed planting until April 15. Voluntary compliance with recommendations was generally good.

Usual surveys were conducted in California and Nevada. One gin trash machine and 7 light traps were operated in Nevada. In California 137 light traps were operated in the fall of 1963. This spring 36 light traps were placed in the field prior to July 1. Inspections of blooms and bolls were made on 160,753 acres; 9,500 lint cleaner inspections were made; and 26,000 bushels of gin trash were examined with the use of Division-owned machines manned by State personnel. States and counties were active cooperators with PPC in these surveys in both Nevada and California.

In central Arizona surveys were planned at a reduced rate on the 1963 crop, but the sudden appearance of pink bollworms in several locations in October resulted in our increasing them considerably. Fifty light traps were used in western and central Arizona through August of 1963. Because of cooperator failure to support the eradication objective, a curtailed survey was planned for 1964. This spring light trap usage in cotton was confined to Yuma County where 42 traps were operated. Twelve traps were also used in mountain passes of Gila and Pinal Counties. A flurry of moth catches near Casa Grande last fall resulted in increasing sex-lure traps from 24 to 51, and this spring 208 such traps were used. Twenty-two moths were caught in the 51 lure traps last fall and none in the light traps. No moths were caught in either type trap this spring.

Early 1963 plans called for the part-time operation of seven gin trash machines with labor costs shared on a 50-50 basis by growers, State, and PPC. In contrast to this, 18 machines had operated full time in

recent years. As a result of population explosions in October, gin trash inspection operations were expanded to full-time use of 14 machines, and field inspections were started to pinpoint suspect fields. By the end of harvest 125,000 bushels of gin trash had been processed, and lint cleaner inspections totaled 24,000. Infestations totaling 4,350 acres were disclosed in 80 fields in 32 localities. No treatment of these fields was done this season. Previous fiscal year surveys had convicted only one location, and at the beginning of fiscal year 1964, treatment was being completed on 223 acres as a result of that find.

By this fiscal year's end, the outlook was far from encouraging for eventual eradication of the pink bollworm in central Arizona. Infestations were almost as widespread as they were when eradication efforts began in 1958-1959, and the indicated pattern of occurrence seems to be westward, toward the Region's cotton-growing areas not yet known to be infested by the pink bollworm.

Arizona PPC regulatory activities were scaled down this year and were confined primarily to enforcing regulations of Federal Domestic Quarantine No. 52. In New Mexico there was a heavy movement of cotton commodities and harvesting equipment that required treatment for certification.

COTTON INSECT SURVEY

FISCAL YEAR 1964



COUNTIES SURVEYED FOR WEEVIL



COUNTIES SURVEYED FOR PINK BOLLWORM

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION
OAKLAND, CALIF.
JULY 1964

SURVEY AND DETECTION REPORT

Program Pink Bollworm

Fiscal Year 1964

State	Number Properties Surveyed	Bushels of Gin Trash	Number Acres Surveyed	Number Traps in Use	Number Positive Specimens	Number Properties Infested	Number Acres Infested
Arizona	714	125,019	33,273	264	4,018	336	14,377
California	396	25,827	-	36	-	-	-
Nevada	-	300	-	-	-	-	-
New Mexico	69	-	-	-	-	-	-
Totals	1,179	151,146	33,273	300	4,018	336	14,377

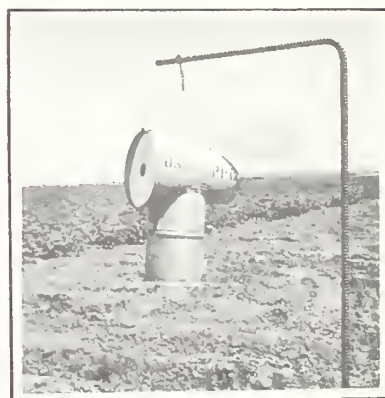
PINK BOLLWORM

END OF THE TRAIL-FOR THE MALE



Impregnating filter cartridge with PBW sex-lure bait for shipment to the field. Each filter cartridge is impregnated with the equivalent of 37 females.

New type PBW sex-lure trap equipped with wind vane and suspended on a swivel mount so that the trap can swing into the wind.

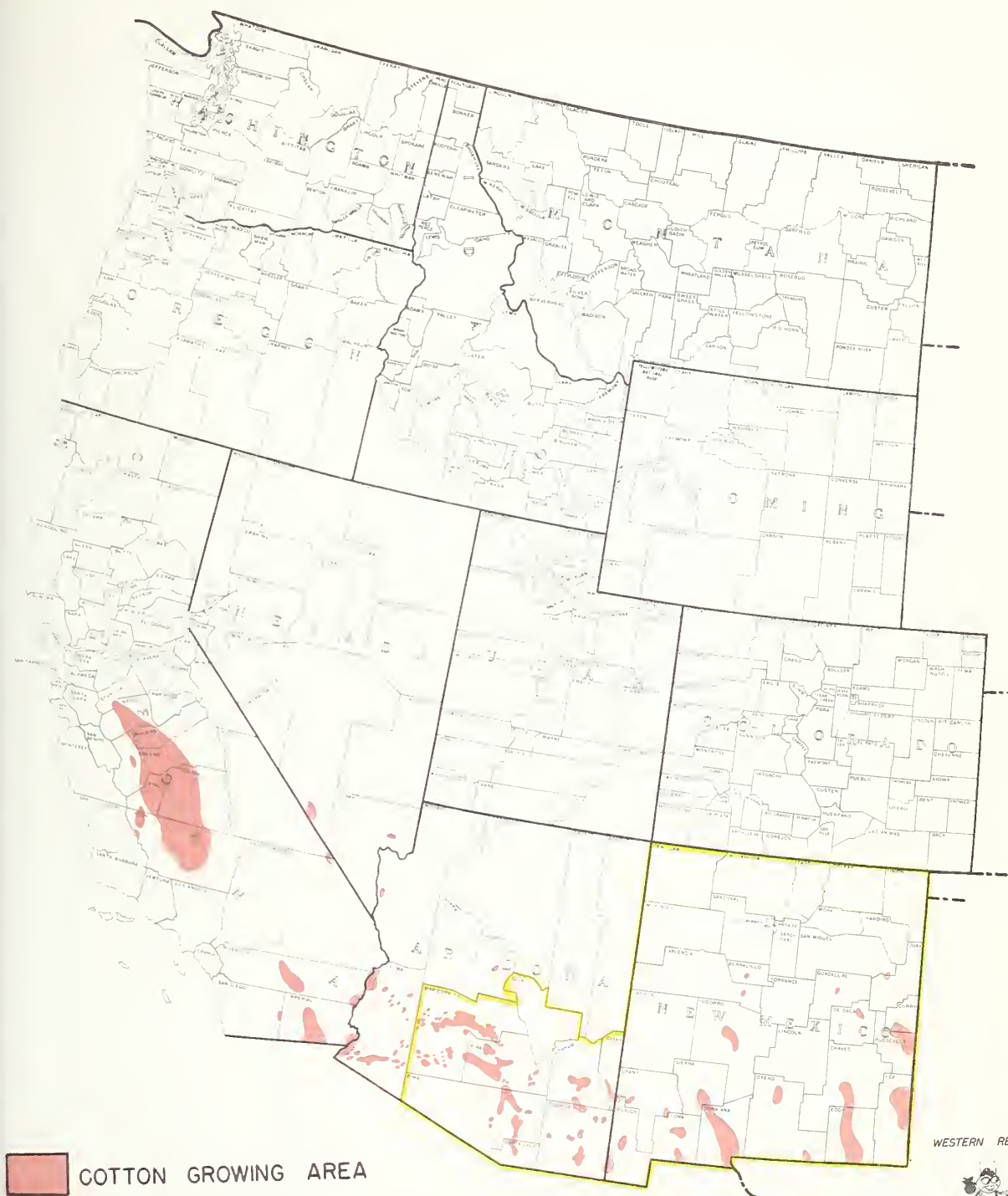


Interior of the sex-lure trap showing filter cartridge in place. At each servicing (twice a week) the oldest cartridge in the trap is replaced with a new cartridge.


Servicing new type PBW sex-lure trap.



PINK BOLLWORM CONTROL



 COTTON GROWING AREA

 REGULATED AREA

WESTERN REGION



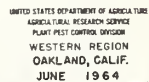
PLANT PEST CONTROL DIVISION
ARS USDA

CONTROL ACCOMPLISHMENT REPORT

Program Pink Bollworm Fiscal Year 1964

State	INSECTICIDE		HERBICIDE	MECHANICAL
	No. Acres Treated	Air		
	Ground		No. Plants Treated	No. Acres Treated
Arizona	0	669	0	360,514

3



REGULATORY ACTIVITY REPORT

Fiscal Year 1964

Program Pink Bollworm

STATE	No. Props.	INSPECTION FOR CERTIFICATION		COMMODITY LOTS TREATED				
				Fumigated		Heated		Other
				Cotton Prod.	Mach. & Equip.	Cotton Prod.	Mach. & Equip.	
Arizona	294	7,801	13	2,151	7,299	3,124	0	1,176,666
New Mexico	74	0	0	4	42	81	0	5,336
Totals	368	7,801	13	2,155	7,341	3,205	0	1,182,002
								8,517
								0
								8,517

ASSOCIATED ACTIVITY REPORT

WESTERN REGION

PROGRAM Pink Bollworm

FISCAL YEAR 1964

STATE	PUBLIC MEETINGS ATTENDED	PRESENTATIONS					EXTENT THESE AIDS WERE USED				SPECIAL REPORTS	MAN-HOURS OF TECHNICAL ASSISTANCE
		TALKS	SLIDES	FILMS	RADIO	TV	FEATURE & NEWS STORIES	EXHIBITS	BUL	CIR	INFEST. MAPS & POSTERS	
Arizona	5	6	5	4	4	5	46	5	4	1,397	3,190	188
California	2	5	1				1		1,032			
New Mexico	2		1							55		
Utah												
TOTAL	9	11	7	4	4	5	47	5	1,036	1,452	3,190	188

Plant Pest Survey





Plant Pest Survey

Cooperative Economic Insect Survey

Arizona's survey entomologist position was filled at the beginning of the report period, thereby activating the cooperative agreement which had been held in abeyance during the fiscal year 1963. Reduction in state-appropriated funds in Oregon necessitated the cancellation of their cooperative survey program which had been inactive since the resignation of the survey entomologist, effective April 30, 1963. This reduced the number of cooperative agreements to six in the Region, with no new contracts under consideration. Even though cooperative survey entomologists are not employed in five of the Western Region states, in most cases weekly reports continue to be submitted by the survey coordinators, promptly and regularly.

Arizona State cooperators sponsored a survey and detection workshop at Phoenix during April 1964. The 2-day workshop was well planned. Good, informative subject matter was presented by an excellent group of speakers. Seventy-five Extension, Experiment Station, commercial, Federal, and State personnel were in attendance.

Detection surveys for economic pests not known to occur in Western Region states were made by PPC personnel while performing other program responsibilities. They included imported fire ant (Solenopsis saevissima richteri); white-fringed beetle (Graphognathus sp.); witchweed (Striga asiatica); European chafer (Amphimallon majalis); gypsy moth (Porthetria dispar); and cereal leaf beetle (Oulema melanopa).

Arizona PPC employees made a number of inspections in millet fields for presence of Tolyposporum smut. Plantings were grown from pearl millet seed which was thought to have been exposed to the smut in Georgia. Inspections were negative.

There was perhaps more general interest developed in all states concerning cereal leaf beetle, due to the publicity in farm magazines, trade journals, and PPC reports regarding the infestations in Michigan and neighboring states. Numerous pamphlets were distributed, and exhibits were made and displayed at local meetings.

Beet Leafhopper (Circulifer tenellus)

As a service to growers of "curly top" susceptible host crops in northern states, surveys for beet leafhoppers are made each year in the spring-breeding areas of southern Utah and Nevada, southeastern California, and southwestern Arizona. This year two surveys were made--one in late January,

the second in mid-March. Immediately upon the completion of each survey, brief summaries of findings were prepared and distributed to appropriate state agencies for use within their states. The reports were also published in the Cooperative Economic Insect Report.

Like surveys conducted by Southern Region personnel in the Texas-Oklahoma spring-breeding areas included a portion of southeastern New Mexico. These findings were included in a combined, bi-regional report.

Again this year PPC participated with ENT and State agency personnel in a survey for beet leafhoppers in Washakie and Big Horn Counties, Wyoming. Impressive results obtained a year ago from applied controls prompted growers and the processors to request aid in delimiting the area in preparation for similar action this spring.

Survey for overwintering beet leafhopper adults and host plants was made during April in the spring-breeding areas of southwestern Idaho. This was followed by a survey in May to determine nymphal populations and to further delimit the area whereon necessary control would be applied. Adverse weather for effective surveys and beet leafhopper survival delayed operations, but the effort was worthwhile since it defined a smaller treatment area than had been anticipated. For the first time, technical Malathion was applied as a concentrate to the area designated for control.

Methods improvement tests were made to determine minimum quantities of technical Malathion that would be effective, and it was found that 3.84 ounces and 6.4 ounces per acre were not effective; 8 ounces per acre gave excellent results, and a total of 11,344 acres were so treated.

Burrowing Nematode (*Radopholus similis*) (Cobb) Thorne

PPC personnel, in cooperation with the Bureau of Plant Pathology, California Department of Agriculture, and various County Departments of Agriculture, participated in a comprehensive burrowing nematode survey during fiscal year 1964.

Two experienced Division employees from the Southern Region's Florida burrowing nematode operations were assigned to the work for 2 weeks to instruct and assist in the initial phases of the survey. Both field and laboratory aspects of the work were shared equally by cooperative agencies.

Root samples were collected from 4,330 properties, representing 149,450 acres of citrus and avocado plantings. This constituted approximately 73 percent of the State's planted acreage of these two crops. No infestations of the burrowing nematode were found in these orchard plantings.

In addition to the inspections listed above and not included in the Division's participation, State and county personnel made inspections of 600 acres of citrus and avocado nurseries, without finding an indication of the presence of the burrowing nematode.

Burrowing nematode was found, however, in 36 greenhouse nurseries on Anthuriums by State inspectors. Many of the plants found infested were several years old. All such plants were destroyed promptly upon the determination of the presence of the pest. In addition, the soil, beds, and equipment associated with the infected plants were fumigated.

Cotton Weevil (genus Anthonomus)

Weevils of the genus Anthonomus were found rather abundantly during the 1963 fall surveys in the cotton-growing areas of Maricopa, Pima, Pinal, Santa Cruz, and Yuma Counties in Arizona. Field and gin trash inspections for pink bollworms and weevils were concurrently made during the harvest season. Although pink bollworm surveys in these counties were considerably scaled down from those of previous years, they still disclosed weevil infestations in 13,183 acres in 212 fields. These locations extend from a point just above Nogales, Santa Cruz County, north along the Santa Cruz River Valley through Pima and Pinal Counties, and from western Maricopa County along the Gila River drainage to Wellton in western Yuma County. This was the most westerly point boll weevils had ever been recorded in Yuma County.

The aforementioned survey findings indicated the possibility that widespread hibernation of weevils might be occurring in boll debris in stub cotton fields and/or in noncotton debris in cotton field margins. Personnel of ENT and PPC Divisions decided that the most practical and economical way to evaluate overwintering populations would be to conduct a survey of these mediums during the period January-March 1964.

PPC employees assisted ENT in these studies. They collected square-yard debris samples from selected fields thought most likely to yield this information from several locations in Pima, Pinal, Santa Cruz, and Yuma Counties. The debris was processed through gin trash machines and over warming tables. Marginal debris (209 square yards from 17 fields) failed to yield weevils in any life stage. However, examination of cotton boll debris (763 bolls) from one known heavily infested stub field in Pinal County and from six stub fields in Yuma County disclosed the following living and dead specimens: adults--live 36, dead 22; pupae--live 1, dead 21; larvae--live 2, dead 35.

Weevil finds recorded above presented the problem of how early and how severely weevils would infest the new stub crop, and to what extent they

would spread to nearby planted cotton during the spring and summer of 1964. The indications prompted further work to gather this information.

PPC and ENT personnel continued their studies, starting in mid-April with the appearance of first seedling cotton. Inspections were made in selected infested stub fields and adjoining planted fields near Stanfield, Pinal County. From leafout stage to squaring, weevil counts were made on a per linear unit of row. When squaring was well under way, counts were carried forward on an infested square-count basis; i.e., the number of infested squares per acre in a field. First field inspections in mid-April led to recovery of four adult weevils; further specimens were collected during succeeding inspections in April and May. Beginning July 1 and continuing into November 1964, the program will be expanded to include additional cotton fields in Pinal County and fields in Maricopa, Pima, Santa Cruz, and Yuma Counties.

Weevil specimens were collected early in 1964 near Aztec, Yuma County, for use in cross-breeding experiments. On the basis of genetic studies, these specimens were found to be very closely related to an Anthonomus weevil, which in recent years has been severely damaging cotton in northern Sonora, Mexico.

This discovery made it advisable to determine the occurrence and density of weevils populating fields in the cotton-growing areas of southern and western Arizona. A cooperative program was developed late in May to conduct a series of cotton field observations in portions of Maricopa, Pima, Pinal, Santa Cruz, and Yuma Counties. Areas to be surveyed, procedures, timing, and records maintenance were developed by the cooperators. Four crews began surveys in the five counties late in May and continued them through June 30. First consideration was given to the inspection of stub and planted cotton fields with a history of weevil infestation. Five hundred squares were inspected per field and recorded as numbers of infested squares per acre and numbers of weevils recovered per inspection. ENT and University of Arizona Experiment Station personnel devoted their activities to special population development studies in selected fields in Pinal and Yuma Counties, respectively.

Concerned by the possible spread of the weevil from neighboring states and Mexico, PPC personnel and cooperators in California and New Mexico initiated a more extensive weevil survey during 1964 fiscal year than was done previously.

To find incipient infestations as early as possible, field inspections of growing cotton and examination of gin trash collections were made throughout the growing and ginning season. Fields selected for survey were in areas

nearest to known weevil infestations. Gin trash processed through trash machines primarily in the quest for pink bollworms was carefully examined for weevils.

As of June 30, 1964, no weevils known to be injurious to cotton had been found in either California or New Mexico.

European Pine Shoot Moth (*Rhyacionia buoliana*)

The European pine shoot moth situation remains much the same as during the 1963 season. Surveys in Washington were conducted by the Washington State Department of Natural Resources and the U. S. Forest Service, without direct assistance from PPC. However, PPC work units are continually on the alert for this pest.

Surveys were made this season in both Washington and Oregon, under the auspices of the agencies mentioned, to further delimit the known pine shoot moth infestations and to locate any new infestations. It is especially interesting that portions of the City of Spokane and the Spokane Valley were given another intensive survey during April and May 1964. The survey failed to disclose any further infestation. Spokane is closely adjacent to the valuable ponderosa pine stands most threatened by the pine shoot moth. The apparent elimination of the pest in this area is therefore of unusual significance.

Regulatory measures enforced by the Washington Department of Agriculture consist of a tagging procedure to regulate movement of trees from nurseries and to prohibit the movement of pines from infested to noninfested areas.

During the 1964 summer season, PPC, at the request of Oregon and Utah Departments of Agriculture, participated in the nursery inspection phase of the European Pine Shoot Moth Program. None of the establishments inspected in either state was found to have any infestation. However, work units of the Oregon Department of Forestry and the U. S. Forest Service found and destroyed a total of 14 infected pines on 11 separate private properties in the greater Portland area.

Fruit Flies

Fruit fly trapping was conducted by PPC personnel in two areas of Arizona--southern Yuma County and from Nogales northward along the Santa Cruz River Valley to Tucson. McPhail traps baited with brown sugar, later ENT-44, were used to trap Mexican fruit flies, while multiple-lure Steiner traps were installed for detecting Mediterranean, oriental, and other fruit flies. Steiner traps were serviced in conjunction with the McPhail traps.

Arizona's first recorded trapping of a Mexican fruit fly occurred July 9, 1964, when a female fly was taken from a trap installed in Nogales, Santa Cruz County. Fifteen McPhail and 15 Steiner traps were in operation in the city at the time of the catch. McPhail traps were increased to 60 in succeeding months. During the 5-month period, July 9 to December 10, the traps caught 46 Mexican fruit flies in the Nogales environs. All fallen host fruits inspected were negative for larval forms. Trapping was discontinued in January, after 3 weeks of negative servicings.

Seasonal trapping for Mexican and other fruit flies was initiated November 1, 1963, in the Yuma-Somerton-San Luis area, Yuma County. Fifty-five McPhail and 19 Steiner traps were placed in commercial citrus and dooryard plantings. They were serviced weekly, with negative results. Trapping efforts were discontinued April 30.

Fruit fly trapping was resumed in south central Arizona in May 1964. Trap locations extended from commercial citrus groves north of Tucson southward along the Santa Cruz River Valley to metropolitan Nogales on the Mexican Border. Seventy-nine McPhail and 15 Steiner traps were serviced; all trap-pings were negative to June 30.

Hall Scale (Nilotaspis halli Green)

The discovery in 1963 of an infestation of Hall scale on an outlying and practically abandoned property emphasized the need for continuing inspections for this hard-to-find fruit tree pest. Search was made in the previously infested area by experienced employees. Considerable latitude was allowed these men in selecting the plantings to work, as it was believed they could best select groves that might need further inspections. They were also encouraged to search for escaped seedlings and abandoned plantings.

Inspections were made of 8,859 hosts on 1,291 properties.

No infestations were found in 1964.

Potato Psyllid (Paratrioza cockerelli)

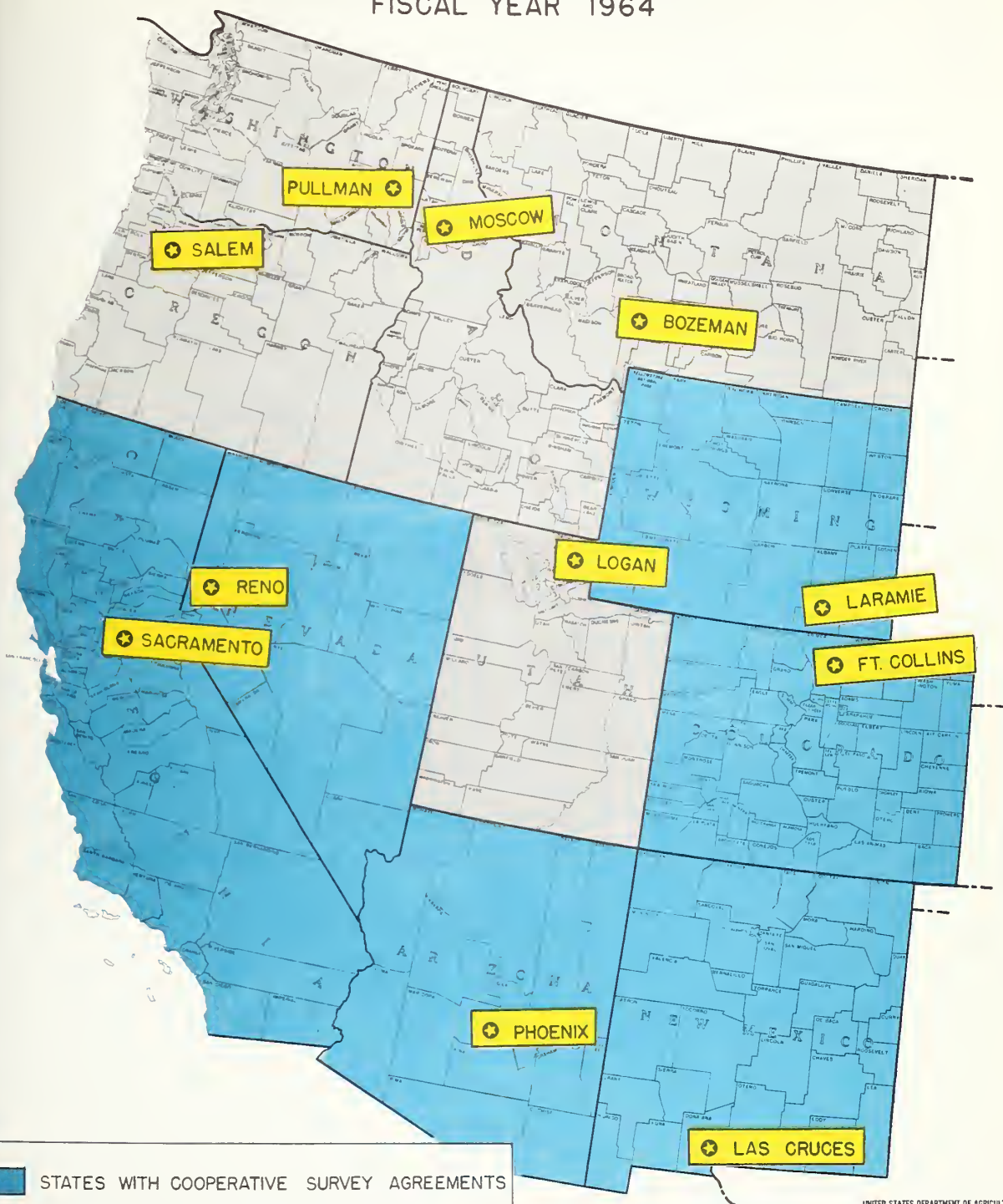
It has been determined that psyllids do not overwinter in the northern states where they cause the most damage, but do overwinter in southern California, Arizona, and Texas. Depending on weather, they move out of the overwintering areas into the north in late March or early April. The size of the psyllid populations occurring in these spring-breeding areas in March determines the potential infestation to be expected in the summer-breeding areas in the northern states. Therefore, as a service to growers of

susceptible crops in adjacent northern states, Western Region personnel make a survey each spring in southern Arizona and southern California to determine psyllid population. A similarly timed survey is also made by PPC in Texas. That effort includes a small portion of New Mexico which supports native host (Lycium) and is known to be a part of the pest's spring-breeding area.

Separate reports are prepared and supplied immediately to appropriate state agencies for their use. Concurrently, the report is carried in the Cooperative Economic Insect publication.

COOPERATIVE ECONOMIC INSECT SURVEY

FISCAL YEAR 1964



- STATES WITH COOPERATIVE SURVEY AGREEMENTS
- STATES WITH NO AGREEMENT
- ★ LOCATION STATE SURVEY COORDINATOR

UNITED STATES DEPARTMENT OF AGRICULTURE
 AGRICULTURAL RESEARCH SERVICE
 PLANT PEST CONTROL DIVISION
 WESTERN REGION
 OAKLAND, CALIF.
 JULY 1964

State Survey Coordinators
For Economic Insect Survey Reports

Arizona	Dr. James N. Roney, Extension Entomologist University of Arizona, Phoenix
California	Mr. Robert W. Harper, Chief, Bureau of Entomology State Department of Agriculture, Sacramento
Colorado	Dr. Leslie B. Daniels, Head, Department of Entomology, Colorado State University, Ft. Collins
Idaho	Dr. H. C. Manis, Head, Department of Entomology University of Idaho, Moscow
Montana	Dr. James H. Pepper, Head, Department of Zoology and Entomology, Montana State College, Bozeman
Nevada	Mr. Lee M. Burge, Director, Division of Plant Industry, State Department of Agriculture, Reno
New Mexico	Mr. Dallas Rierison, Director, New Mexico Department of Agriculture, New Mexico State University University Park
Oregon	Mr. Hugh Taylor, Chief, Division of Plant Industry State Department of Agriculture, Salem
Utah	Dr. George F. Knowlton, Extension Entomologist Utah State University, Logan
Washington	Dr. Horace S. Telford, Chairman, Department of Entomology, Washington State University, Pullman
Wyoming	Dr. Robert E. Pfadt, Head, Department of Entomology University of Wyoming, Laramie

Survey Entomologists

Arizona	Mr. Dale G. Fullerton Arizona Commission of Agriculture and Horticulture	Phoenix
California	Mr. Ronald Hawthorne State Department of Agriculture	Sacramento
Colorado	Mr. Leonard E. Jenkins Colorado State University	Ft. Collins
Nevada	Mr. Robert C. Bechtel State Department of Agriculture	Reno
Wyoming	Mr. William D. Marks University of Wyoming	Laramie

COTTON WEEVIL - ARIZONA

YES, THEY ARE WEEVILS, BUT WHAT SPECIES ?



Collecting debris samples for hibernation studies in the environs of weevil-infested fields in Pinal County.



Collecting bolls from infested fields to check for hibernating weevil.



Debris sample being processed through gin trash machine, Pinal County, Arizona.



Hibernation study cages containing debris from infested fields and from the environs of infested fields.



Trash from debris sample after processing through gin trash machine.



Checking debris trash on warming tables to recover hibernating weevil.

SURVEY AND DETECTION REPORT

Program Plant Pest Survey

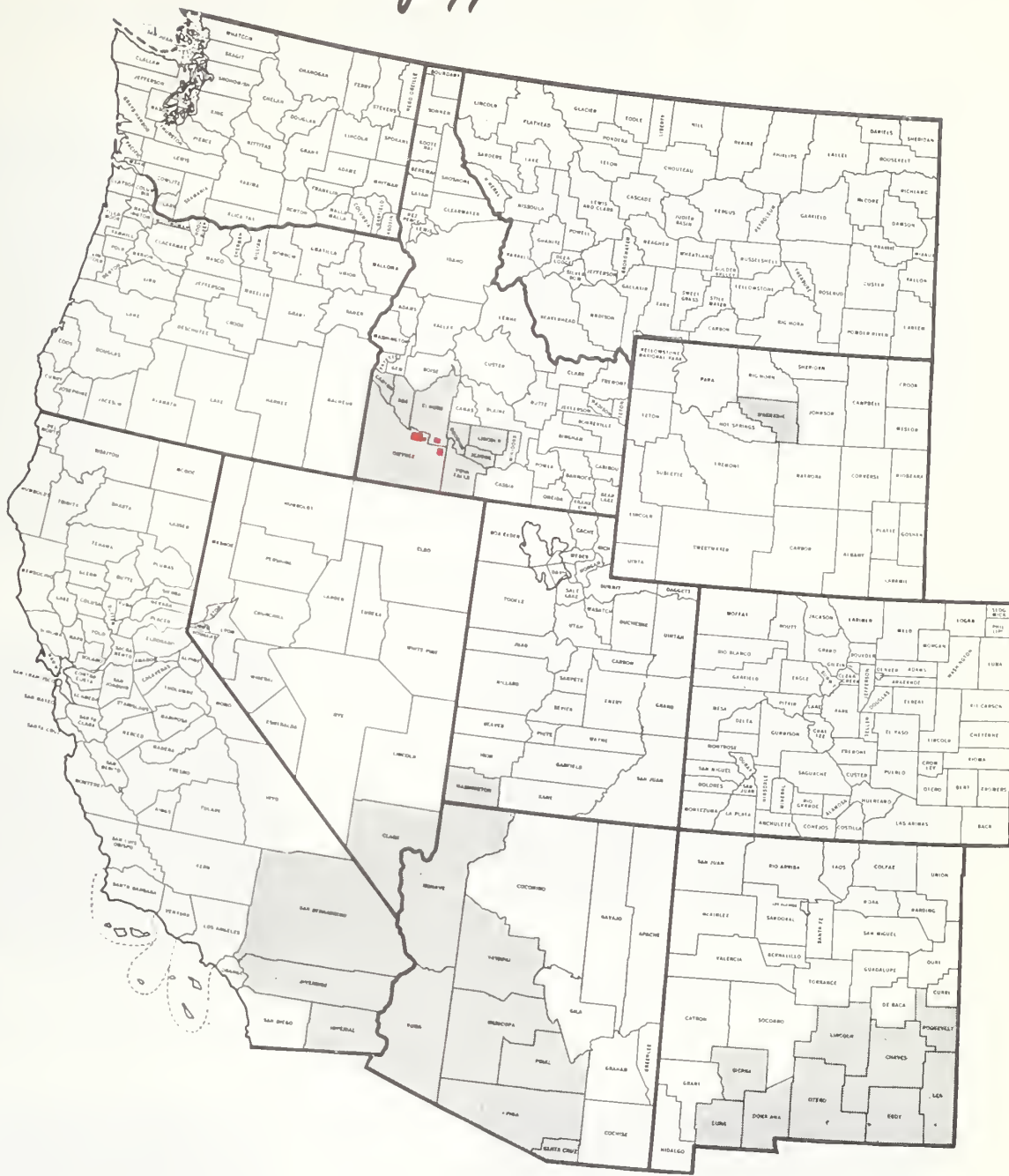
Fiscal Year 1964

Pest	No. Properties Surveyed	No. Acres Surveyed	No. Traps in Use	No. Hosts Examined	No. Samples Collected
Boll Weevil	21,919				
Burrowing Nematode	4,330	149,450			6,842
Cereal Leaf Beetle	219				
Citrus Blackfly	159			335	
European Chafer	8		42		
Gypsy Moth			56		
Hall Scale	1,291			8,859	
Imported Fire Ant	44				
Insect Detection*	89	107		1,126,481	
Mediterranean Fruit Fly			15		
Witchweed	7	201			
Totals	28,066	149,758	113	1,135,675	6,842

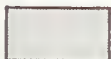
*Majority covers European Pine Shoot Moth and economic non-program pests of concern

Beet Leafhopper 1964

46



AREAS WHERE CONTROLS APPLIED
(11,344 acres)



COUNTIES SURVEYED



BURROWING NEMATODE

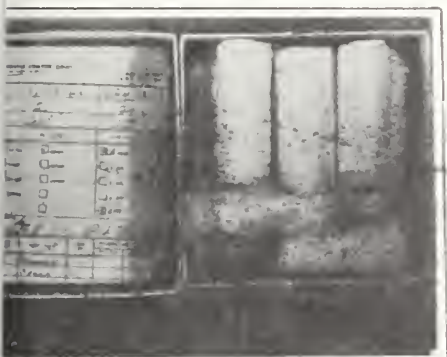
NEMATODES ARE WHERE YOU FIND THEM AND THEY'RE NOT EASY TO



In cooperation with California State and County Departments of Agriculture, Plant Pest Control made a comprehensive survey for burrowing nematode. Approximately 75% of the commercial citrus and avocado plantings in the State were sampled. Root samples were obtained by various methods -- one device is the post hole digger shown at the left.



Surveyor selecting roots from soil dug with shovel from the required depth.



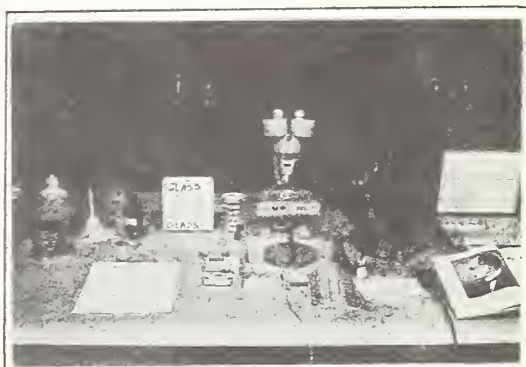
samples, properly identified, were washed, ed to incubate, then prepared for shipment verside laboratory where they were examined urrowing nematode.




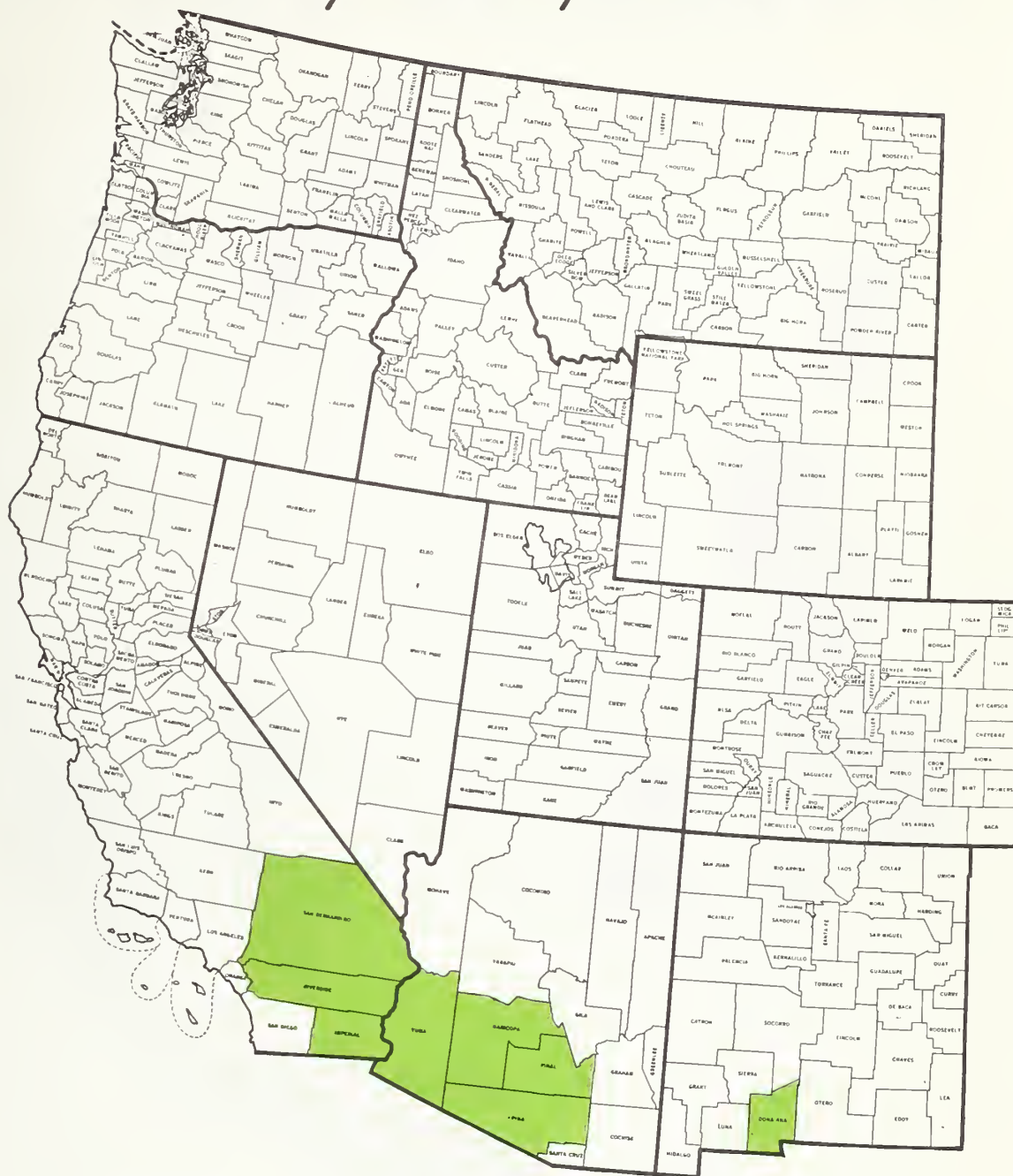
Root samples upon receipt at laboratory were carefully arranged and examined to assure identification of sample in the event of a positive recovery.



spectors carefully examining incubated root ples.



Equipment used in Riverside laboratory.



COUNTIES SURVEYED

UNITED STATES DEPARTMENT OF AGRICULTURE

COOPERATIVE SURVEYS WITH STATES & COUNTIES PARTICIPATING

LEGEND:

- COUNTIES SURVEYED FOR STEM RUST
- COUNTIES WHERE LIGHT TRAPS WERE EXPOSED
- COUNTIES WHERE BOTH SURVEYS WERE CONDUCTED

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION
OAKLAND, CALIF.
JULY 1964

ASSOCIATED ACTIVITY REPORT

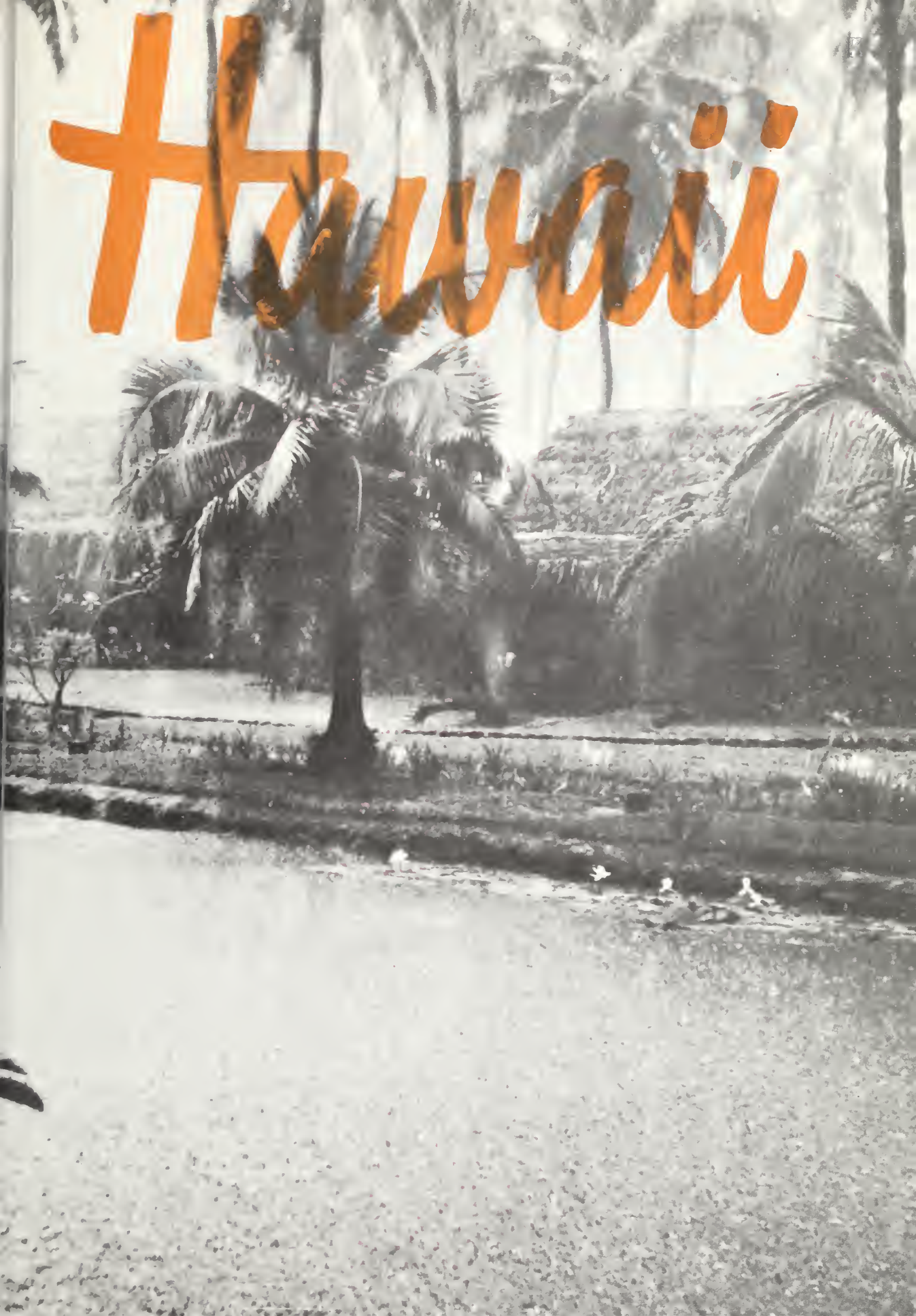
WESTERN REGION

PROGRAM Plant Pest Survey

FISCAL YEAR 1964

STATE	PUBLIC MEETINGS ATTENDED	PRESENTATIONS					FEATURE & NEWS STORIES	EXTENT THESE AIDS WERE USED				SPECIAL REPORTS	MAN-HOURS OF TECHNICAL ASSISTANCE
		TALKS	SLIDES	FILMS	RADIO	TV		EXHIBITS	BUL	CIR	INFEST. MAPS & POSTERS		
Arizona	7	4			1	1	23	9	245	4,217	282	166	417
California	3	9	3	7			1	4	301	352			15
Colorado	3	3	127	1			1	1	574	215	516	2	416
Idaho									234	430	96		
New Mexico									874		113		
Oregon				1						700	80	24	
Utah	2	6	4		4		2	1	5,300	14,975		5	
Washington										1,119	590	30	
Wyoming	2	2							276		211		
TOTAL	17	24	134	9	5	1	27	15	7,804	22,008	1,888	227	848

Hawaii





Hawaii

Director Burgess, at the request of Hawaii's congressmen, visited the Islands during the fiscal year to study their over-all economic plant pest problems, paying particular attention to the southern green stink bug and fruit flies. After careful consideration and preliminary observations, it was decided to assign an experienced supervisor to the area for a 6- to 8-month period to make a more intensive study of their pest problems, and at the same time actively assist in the southern green stink bug project which obviously needed immediate attention.

The southern green stink bug was first discovered on the island of Oahu in October 1961 and has since become generally distributed throughout the arable areas of that island and on the remainder of the major islands comprising the State of Hawaii. This insect does serious damage to crops such as snap beans, corn, tomatoes, oranges, and Macadamia nuts in the shell. To a lesser degree it damages such produce as broccoli, cauliflower, and some fruits. The island crops especially susceptible to southern green stink bug attack are valued at more than \$2 million annually.

Early efforts to eradicate the southern green stink bug in Hawaii through the use of chemicals failed--due not only to the lack of a suitable insecticide and treatment procedure, but also to the extremely rugged terrain, host range, and cropping practices.

Early "screening" of a number of potential insect parasites against the southern green stink bug revealed that two were effective--one a Scelionid wasp, Telenomus basalis, which attacks the eggs; the other a Tachinid fly, Trichopoda pennipes, (Florida and Trinidad strains) which attacks the adult. The decision was made to concentrate efforts to biologically control this pest. The Division, therefore, established with the State of Hawaii a cooperative control program to suppress stink bug population on the Islands.

The parasites were mass-produced in insectaries located at Honolulu, Hilo, Kealahou, Lihue, and Kahului. It requires approximately two years to propagate the parasites and get them established to the degree that economic control is obtained. At the present time the islands of Oahu and Kauai have been saturated with parasites to the extent that damage by the stink bug is no longer a problem. The infestations on the islands of Maui, Molokai, and Hawaii developed later and are still in need of additional biological control. This is especially true in the Kona (leeward) district of the island of Hawaii where serious damage to truck crops and Macadamia nuts has occurred. Parasite propagation and release will no doubt be required for another year in these problem areas.

The Plant Pest Control Division entered into the parasite propagation program on a cooperative basis on February 17, 1964, when the agency assumed responsibility for the operation of the insectary at Kealahou on the Big Island. Two Federal employees began the propagation of the egg parasite, Telenomus basalis. Approximately 90,000 egg parasites have been produced and released in the area per month since taking over of the insectary from the State. The adult parasite, Trichopoda pennipes, produced at the state-operated Hilo and Honolulu insectaries, has also been released in the Kealahou or Kona district.

In addition to the cooperative biological control project, the Division will continue to observe and report on other pest problems.

Along with these observations, emphasis will be placed on developing and coordinating a general insect detection program. Efforts will be made to organize cooperative participation by all entomologists on the Islands--Federal, State, Experiment Station, and industry.

Hawaii has many economic insect pests, most of which have been introduced. The Islands' constant exposure to new pest introductions by natural (winds) and mechanical (ship and plane) means, and by man (tourists), coupled with the variations of weather, altitude, and host crops, makes them particularly subject to ever increasing pest problems.

For those, who, like ourselves, are not familiar with the state's subdivision, Hawaii is comprised of many islands, which are grouped into five counties, as follows:

<u>County</u>	<u>Island</u>
Hawaii	Hawaii
Maui	Lanai, Kahoolawe Molokai, and Maui
Kauai	Kauai, Niihau
Kalawao	Kalaupapa on the island of Molokai (leper settlement)
Honolulu	Oahu and all the remaining smaller islands in the chain

BIOLOGICAL CONTROL

Two species of insect parasites are proving effective against the southern green stink bug. Both of the parasites are being propagated in Federal and State insectories and released in infested areas with very good results.



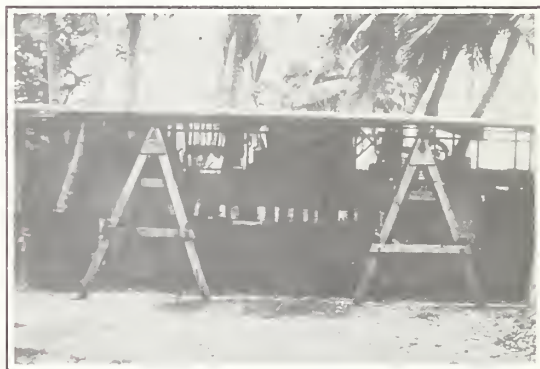
Telenomus basalis--A Hymenopterous egg parasite of the southern green stink bug.



Trichopoda pennipes--A tachinid parasite of the southern green stink bug.



Insectary located in the vicinity of Kainallu, on the Island of Maui, operated by PPC for the rearing of the Tachinid parasite, Trichopoda pennipes.



State operated temporary insectary on the Island of Maui where, among other projects, the southern green stink bug parasite Telenomus basalis is propagated.

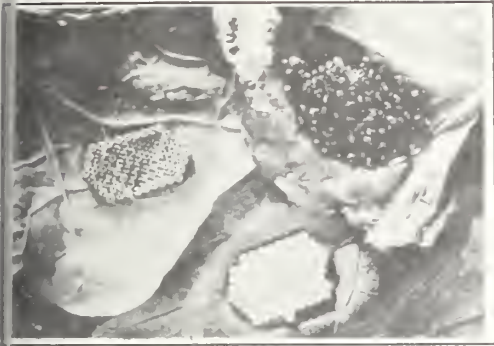


Inspectors releasing parasites of the southern green stink bug.



SOUTHERN GREEN STINK BUG

DISCOVERED ON THE ISLAND OF OAHU IN OCTOBER 1961. THIS PEST IS NOW ON ALL THE MAJOR ISLANDS THAT COMPRISE THE STATE OF HAWAII.



The southern green stink bug causes serious damage to some vegetable and fruit crops and Macadamia nuts in the shell.

At left is shown cluster of green stink bug eggs on underside of leaf.



Southern green stink bug feeding on corn.



State and Federal inspectors examining passion fruit orchard damaged by the southern green stink bug.



Fifth instar nymphs of the southern green stink bug.



Tomatoes damaged by the southern green stink bug.



UI



HAWAII

UPOLU PT.

AWAIIHAE

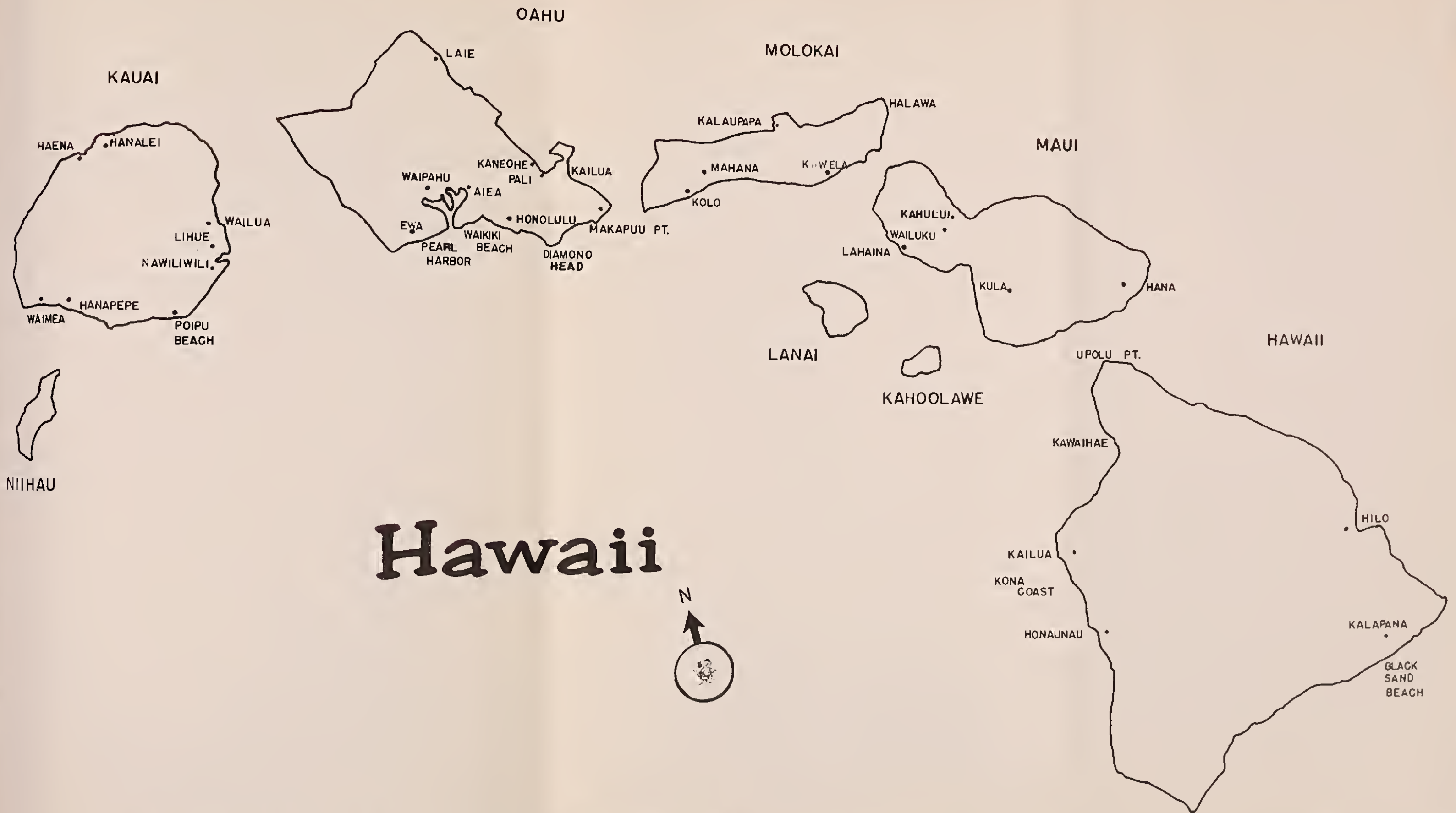
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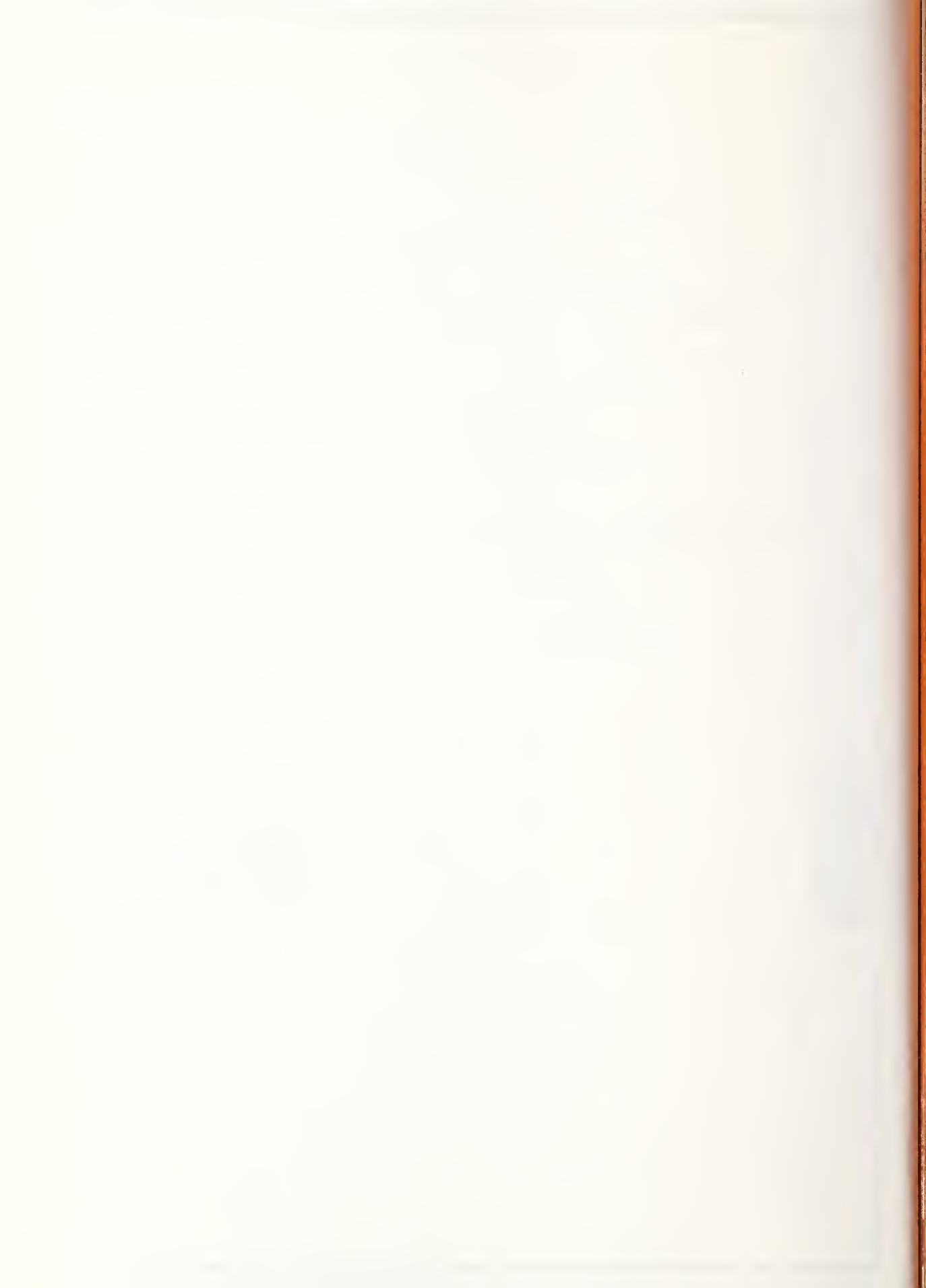
HILO

NAU

KALAPANA

BLACK
SAND
BEACH









Be Alert !

REPORT PROMPTLY ANY NEW OR UNUSUAL PLANT
PEST TO YOUR NEAREST AGRICULTURAL OFFICIAL

